PERCEPTIONS OF LEADERSHIP AND STUDENT PERFORMANCE IN SCIENCE FROM CAMPUS LEADERS IN SELECTED HIGH SCHOOLS

A Dissertation

by

SHARON MAE WILDER

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2010

Major Subject: Educational Administration

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Approved by:

Co-Chairs of Committee,	John Hoyle
	Virginia Collier
Committee Members,	Toby Egan
	Larry Kelly
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ABSTRACT

Perceptions of Leadership and Student Performance in Science from Campus Leaders in Selected High Schools. (May, 2010)

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Co-Chairs of Advisory Committee: Dr. John Hoyle
Dr. Virginia Collier

This naturalistic study focused on the perceptions of leadership and student performance in science from campus leaders in three purposefully selected secondary campuses of ninth through twelfth grades. Each school had experienced an improvement in student passing rates on the science TAKS test that exceeded the state's percent improvement in passing rates for the past three years and had a record of improving science TAKS scores for the period of 2003 to 2008 exceeding fifteen percentage points.

The qualitative research technique of multi-case studies design was used. Data was collected through semi-structured, in-depth interviews with four campus leaders from each of the selected schools. These campus leaders included campus administrators, science department chairs, and grade-level team leaders. A framework of transformational leadership was utilized in the analysis of the data generated from the interviews.

The perception from the campus leaders was that leadership has a positive impact on student success in science. The findings indicated perceptions of leadership from the campus leaders had certain leadership practices in common. These included (a) clear

vision and goals from the campus principal, (b) high performance expectations for teachers and students from administrators and science department leaders, (c) encouragement and support from campus administrators and science department leaders to develop new programs to address problem areas, (d) emphasis on collaborative teams, and (e) open door policy from administrators.

DEDICATION

This dissertation is dedicated to my parents,

Hugh and Rita Wilder,

for their unconditional love and support.

ACKNOWLEDGEMENTS

Many, many thanks to my dissertation committee co-chairs, Dr. John Hoyle and Dr. Virginia Collier, for their positive attitudes and support throughout the dissertation process. Thanks also to my committee members, Dr. Toby Egan and Dr. Larry Kelly, for their timely advice and encouragement. This study would not have been possible without the help of each of these remarkable individuals.

Special thanks to my husband, Phil, for all his love and support. Thanks also to my friends and family for their support and encouragement. No one ever makes this journey alone, and I am blessed to have so many wonderful supporters. Extra thanks to my sister, Kathy, for all her help and reminders to stay focused. Thanks to my friends, Josie, Kris, Brian, and Robin for all their help. Thanks also to my school district support, Joy, Donna, Maryann, Jennifer, Barbara, Claudia, and the high school science team.

Most of all, thanks to God for blessing me with this opportunity to learn, to grow, and to share His love with others. This has truly been a wonderful experience!

TABLE OF CONTENTS

CHAPTER Page

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

The emphasis in science education today is on accountability and success for all students. In Texas that accountability and success is measured by the Texas Academic Knowledge and Skills (TAKS) tests. Each year in Texas, public school administrators, counselors, and teachers administer TAKS tests for reading/writing, math, social studies, and science to students in third through twelfth grades. In order to graduate from a public high school, students must pass the exit level TAKS tests in the four core subject areas of social studies, English language arts, mathematics, and science. Unfortunately, not all students are successful on these TAKS tests, especially on high school science TAKS. At the high school level, science testing is required in both the tenth and eleventh grades. Data released by the Texas Education Agency (TEA) indicates that only 65% of high school students passed the 10th grade science TAKS test administered in April 2008.

Clearly, not all of our students are experiencing success in learning science. However, there are high schools in Texas with passing rates on the TAKS science test approaching 90%, indicating that their students are experiencing success in learning science. Other schools, while not achieving passing rates of 90%, have demonstrated sustained yearly improvement in the passing rates, indicating increasing student success in learning science. Research tells us that effective school leadership has a positive

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This dissertation follows the style of *Educational Administration Quarterly*.

impact on student learning, either directly or indirectly (Day, 2004; Day, Harris, & Hadfield, 2001; Hallinger & Heck, 1996, 1998; Harris, 2002; Leithwood & Jantzi, 2008; Leithwood, Harris, & Hopkins, 2008; Marzano, Waters, & McNulty, 2005; Penlington, Kington, & Day, 2008). Therefore, this study focuses on the perceptions of leadership practices and success in science from campus administrators and science department leaders on campuses showing increasing student success in science above the percent of improvement of the average passing rate on the science TAKS test. For the purposes of this study, student success in science is defined as the ability to pass the science portion of the TAKS test.

The present study utilizes a framework of transformational leadership theory as proposed by Leithwood and Jantzi in 1999 and further refined by them in 2005. Leithwood and Jantzi (1999) defined transformational leadership in terms of six leadership and four management dimensions. They described the leadership dimensions as: (a) building school vision and goals, (b) providing intellectual stimulation, (c) offering individualized support, (d) symbolizing professional practices and values, (e) demonstrating high performance expectations, and (f) developing structures to foster participation in school decision (p. 454). They described the management dimensions as (a) staffing, (b) instructional support, (c) monitoring school activities, and (d) community focus (p. 454). The present study utilizes the leadership dimensions of the Leithwood and Jantzi model.

In their 1999 study on transformational school leadership, Leithwood and Jantzi reported that “results demonstrated strong significant effects of such leadership on organizational conditions and moderate but still significant total effects on student

engagement" (p. 451). In more recent studies, transformational leadership was also linked to teacher motivation, teacher job satisfaction, organizational commitment, teacher self-efficacy, collective teacher efficacy, leader efficacy, changed teacher practices, and student achievement (Griffith, 2004; Leithwood & Jantzi, 2006; Leithwood & Sleegers, 2006; Ross & Gray, 2006).

Research that examined transformational leadership in schools and the effects of leadership on the schools, teachers, and students indicated positive effects with respect to school organizations, teachers, and students (Geijsel, Sleegers, Leithwood, & Jantzi, 2003; Sergiovanni, 1995). In their study of extraordinary leaders in educational settings, Kirby, Paradise, and King (1992) found transformational leadership to be particularly effective in the public school arena. While it has been stated that campus leaders respond to the challenge of ensuring success for all students based on their own individual leadership styles (Hoy & Miskel, 1996), certain aspects of leadership such as vision, ability to communicate, ability to motivate, and ability to build relationships, are found in transformational leadership theory (Northouse, 2004). Therefore, the use of a framework of transformational leadership theory will provide a basis for understanding the leadership on today's campuses.

Statement of the Problem

If Texas is to remain at the forefront of economic growth and development, the educational system in Texas must prepare students to compete globally for high-tech jobs. Many of these high-tech careers will require strong science skills. In addition, an understanding of science will help students to understand the world around them while

aiding in the development of their decision-making and problem-solving skills (Harlen, 2001). It is obvious that many Texas high school students are struggling in science because only 65% of Texas high school students passed the 10th grade science TAKS test in April 2008. As demand from the public sector grows at the national level for increased student success in science, pressure from the state accountability system also grows. To meet these demands, our school leaders will need to have a clear understanding of what effective leadership practices look like on a campus with improving student success in science.

Purpose of the Study

This naturalistic study was undertaken to shed some light on the issue of leadership and student success in science by examining perceptions from school administrators and science department leaders regarding leadership practices on campuses with improving student success in science. By exploring these perceptions, insight was gained concerning the role leadership plays in student success in science thereby providing additional information to campus leadership desiring to help every student succeed.

Research Questions

This study will answer the following questions relating to student success in science:

1. What are the perceptions from administrators with respect to leadership and successful student performance in science on their campuses?

2. What are the perceptions from science department leaders with respect to leadership and successful student performance in science on their campuses?

Methodology

High school campuses are complex entities with countless variables, interactions, and pressures. Because it was my desire to understand each campus and its components and interactions with a richness and depth of detail, I felt that a naturalistic study using the qualitative research technique of multi-case studies design (Lincoln & Guba, 1985) would be the most effective method of research.

Site Selection

Three participant schools were purposefully selected based on several factors. All selected schools are secondary campuses with ninth through twelfth grades, which met the following criteria:

1. The campuses have experienced an improvement in student passing rates on the science TAKS test that exceeds the state's percent improvement in passing rates for the past three years.
2. The campuses have experienced an increase in student passing rates on the science TAKS test exceeding 15 percentage points for the period 2003-2008 demonstrating a history of improvement.
3. The science department leaders (department chairs and grade-level team leaders) have held their positions during the most recent three-year period of increasing passing rates, and were available for interviews.

4. The administrators have held their administrative positions on the campuses during the most recent three-year period of increasing science performance and were available for interviews.
5. The campuses are within the Texas Educational Service Center (ESC) Region IV in order to strengthen the commonality of support systems and training available to each campus. ESC Region IV currently serves 54 school districts with over 150 high schools in eight counties in Texas and over 1,000,000 students. These school districts are located in urban areas such as Houston ISD as well as the rural areas of Hempstead ISD.

Data needed for the selection of campuses is publicly available from the Academic Excellence Indicator System (AEIS) reported through the Texas Education Agency (TEA) and campus websites. Campuses with a TEA rating of *Exemplary* were not selected because considerable research on exemplary schools already exists. Pseudonyms for the campuses and participants have been used to ensure confidentiality.

Data Collection

Data for this study was collected from in-depth interviews with campus administrators, science department chairs, and grade-level team leaders at each site. The interviews took place on each campus in a conference room or in the teacher's classroom. These interviews were semi-structured and audiotaped. Follow-up phone interviews or emails were conducted on an 'as needed' basis for clarification or for additional questions.

Data Analysis

Data gathered through the interviews was broken down into units, categorized, coded, and analyzed for emerging themes and sub-themes. This analysis involved the process of categorizing information, determining emerging themes, and then re-categorizing the information to support any newly emerging themes as the analysis continued. Themes and sub-themes were analyzed with respect to constructs found in transformational leadership theory.

Definition of Terms

The following terms were used in this study.

1. Academic Excellence Indicator System (AEIS) -- The AEIS is a report generated by the Texas Education Agency to provide public information on campus and district performance on the TAKS tests as well as related demographic information.
2. Campus Administrators -- For the purposes of this study, campus administrators include campus principals, associate principals, assistant principals, and science coordinators.
3. School Leadership -- For the purposes of this study, school leadership refers to both principal leadership as well as teacher leadership.
4. Science Department Leaders -- For the purposes of this study, science department leaders include teachers serving as department chairs, grade-level team leaders, content-level team leaders, or lead teachers functioning as team leaders.

5. Texas Assessment of Knowledge and Skills (TAKS) -- The TAKS is a state-mandated and state-wide program of assessment of the Texas Essential Knowledge and Skills (TEKS) administered each spring semester in public schools to students in 3rd through twelfth grades. Subjects tested include Reading, Writing, Math, Science, and Social Studies. Students attending private schools or in home schooling are not required to take the TAKS tests. This assessment replaced the previous state-mandated test identified as the Texas Assessment of Academic Skills or TAAS test in 2003.
6. Texas Education Agency (TEA) -- The TEA is a state agency that is responsible for primary and secondary education in Texas. Its responsibilities include: (a) managing and coordinating the development of the statewide curriculum (TEKS) and the assessment of that curriculum (TAKS), (b) maintaining a statewide accountability system for schools; (c) supervising the adoption of classroom textbooks, (d) administering the data collection system on public school students, staff, and finances, (e) providing accountability for compliance and distribution of state and federal funds, and (f) supporting research and information programs at the state, district, and campus levels.
7. Texas Essential Knowledge and Skills (TEKS) -- TEKS is a state-mandated curriculum for students in public schools from Kindergarten through twelfth grade. This curriculum provides detailed explanations of the skills and knowledge that students are expected to master at each grade level and in each curriculum area in order for them to be successful throughout their school years and prepare them for work or higher education.

Assumptions and Limitations

For this study, it was assumed that information provided by the administrators and teacher leaders accurately reflected the situations and conditions found on each campus. It was also assumed the participants for this study would be truthful when discussing their perceptions of the leadership and success in science on their campuses.

Because this study was conducted on a small number of selected high schools, any conclusions or findings cannot be generalized to other high schools. However, they may provide direction for campuses with similar demographics and organizational systems. It should be noted that campus leaders might tend to report the impact of leadership favorably. Any conclusions or findings about the leadership characteristics or practices of the administrators and science department team leaders may not be applicable to other content areas. Curriculum, instructional strategies, and assessment issues were not part of the focus of this study. In addition, during the interview process it was discovered that two of the three principals had science backgrounds. Their backgrounds may have influenced their support of the science departments on their campuses but this is not addressed in the present study.

Significance of the Study

As pressure increases on public schools for improved student outcomes in high school science, federal mandates stress the need to use research-based solutions to guide their efforts. Additional research is needed in the area of science (Day, Leithwood, & Sammons, 2008; Rigano & Ritchie, 2003) as well as the area of leadership and student outcomes (Marzano, Waters, & McNulty, 2005). This study adds to the research base of

leadership practices of campus administrators and science department leaders on campuses experiencing student success in science. As stated earlier, by studying these practices, valuable insight may be gained concerning the role leadership plays in student success in science thereby providing additional information to campus leadership desiring to help every student succeed.

Chapter Overview

This naturalistic study is presented in seven chapters. The first chapter presents an overview and introduction to the study. Chapter II provides a literature review of the background of transformational leadership theory, the application of transformational leadership theory to school environments, a discussion of the transformational leadership framework utilized in this study, and a literature review of school leadership and student success, including student success in science. Chapter III discusses the methodology used in this study including site selection, data collection, and data analysis. Chapters IV through VI provide the case studies on each of the schools selected for this study and the perceptions of the individuals interviewed. In order to maintain confidentiality, actual names of schools and participants have been replaced with pseudonyms. Chapter VII presents a summary of the study, conclusions, and suggestions for further research.

CHAPTER II

REVIEW OF THE LITERATURE

In today's environment of high accountability and demands from the public and policy makers for student success, campus leaders are interested in what actually impacts student learning. A substantial body of research conducted over the past two decades has identified a multitude of variables that influence student learning. These include school leadership, school environment, school culture, student factors, parental background, and teacher factors (Ashton & Webb, 1986; Blankstein, 2004; Cotton, 2003; Day, Sammons, Hopkins, Leithwood, & Kington, 2008; Deal & Kennedy, 1983; Gerald, Bowyer, & Linn, 2008; Hallinger, Bickman, & Davis, 1996; Heck, 1992; Leithwood & Day, 2008; Leithwood & Mascall, 2008; Marzano, Waters, & McNulty, 2005; Penlington, Kington, & Day, 2008; Pounder, Ogawa, & Adams, 1995; Reeves, 2006; Ritchie, Mackay, & Rigano, 2006; Siskin, 1991; Wang, Haertl, & Walberg, 1993; White, 1982). The area of focus for this study was school leadership, which included both administrators and teachers.

In order to understand the role school leadership plays in student achievement, specifically student achievement in science, the present study focuses on the perceptions of leadership practices from school leaders on selected campuses that experienced student success in science. Because the study is framed through the theoretical lens of transformational leadership theory, this selective review of the literature begins with a look at leadership theories, transformational leadership theory, components of transformational leadership theory, and the application of transformational leadership to

schools. This is followed by a review of the literature on research focusing on school leadership and its impact on student achievement, the role of the principal in school improvement, and student improvement processes in the science content area.

Leadership Theory and Schools

Researchers in the field of education have frequently applied leadership theories from industry and organizations to the school environment (Guthrie & Reed, 1991; Hoy & Miskel, 1996; Lunenburg & Ornstein, 2000; Marion, 2002; Oliva & Pawlas, 1997; Ubben & Hughes, 1997), and most if not all advanced degrees in Principal Certification or Educational Administration include a course on leadership. To say that "leadership" is a complex, multi-sided concept is an understatement (Davis, 1998; Wahlstrom, 2008). Examples of these organizational leadership theories include (a) trait-based leadership theory, which implies that great leaders possess certain leadership traits, (b) behavioral leadership theory, which focuses on the behaviors of leaders, (c) contingency theory, which focuses on leader-member relations, task structure, and position power of the leader, and (d) transformational leadership theory, which focuses on leader-follower relations and exchanges (Antonakis, Cianciolo, & Sternbert, 2004). During the 1990s, researchers began applying one of these organizational leadership theories, transformational leadership, to the school environment (Day, 2000; Leithwood, 1994, 1995; Sagor, 1992; Sergiovanni, 1995).

Background of Transformational Leadership Theory

Transformational leadership theory has its roots in the work of political scientist and social historian James MacGregor Burns. In his 1978 work, Burns made a distinction

between managers and leaders and the relationship of each of these to sources of authority. He also addressed the interactions between leaders and followers and defined two forms of interaction: transactional and transformational (Antonakis, Cianciolo, & Sternbert, 2004; Marion, 2002; Northouse, 2004). According to Burns, transactional leadership is more closely aligned to the concept of a manager with an economic source of authority between leaders and followers with more of the transaction-like attitude of a trade. The transactional manager expects the followers to do something in exchange for certain rewards.

In contrast, Burns (2003) defined transformational leadership as having more of a non-economic source of authority in which the transformational leader considers the motives and needs of followers and appeals to these higher needs, thus raising each other to higher levels of motivation and morality (Geijsel et al., 2003). Sergiovanni (1995) stated it more clearly, "[Burns] identified two broad kinds of leadership: transactional and transformative. Transactional leadership focuses on basic and largely extrinsic motives and needs; transformational leadership focuses on higher-order, more intrinsic and ultimately moral motives and needs" (p.117).

Bass and Riggio (2006) defined transformational leadership as:

> Transformational leaders motivate others to do more than they originally intended and often even more than they thought possible. They set more challenging expectations and typically achieve higher performances. Transformational leaders also tend to have more committed and satisfied followers. Moreover, transformational leaders empower followers and pay attention to their individual needs and personal development, helping followers to develop their own leadership potential. (Bass and Riggio, 2006, p. 4)

In a review of eight theoretical approaches to transformational leadership, Sashkin (2004) described behavioral competencies, personal competencies, and contexts that are

central to an understanding of transformational leadership. These include (a) behavioral competencies (communicating a vision, creating empowering opportunities, and expressing caring and respect for followers), (b) personal competencies (vision, need for power and its expression, and self-confidence), and (c) situation or context (developing a culture, and defining values, beliefs, and assumptions held by all).

These constructs of transformational leadership match those identified by research as important traits of effective school leaders. In her synthesis of eighty-one research articles focusing on principals' behaviors in relation to student outcomes, Cotton (2003) reported that the elements of transformational leadership, "mirror the behavior of principals in high-performing schools: establishing a worthy vision and clear goals, providing individualized support to staff, holding high performance expectations, engaging others in decision making" (p. 61).

Christopher Day (2000) reported on a leadership study in the United Kingdom that identified key characteristics of successful school leaders as (a) value-led, (b) people-centered, (c) achievement-oriented, (d) inward and outward facing, and (e) able to manage a number of ongoing tensions and dilemmas (p. 56). Day stated, "Leadership is essentially building and maintaining a sense of vision, culture, and interpersonal relationships" (p. 57). His description of leadership practices matches the transformational leadership constructs of idealized influence, individualized consideration, and inspirational motivation. As mentioned earlier, transformational leadership theory has played a significant role in understanding the complex world of school leadership.

Transformational Leadership in Schools

Many educational researchers agree with the usefulness of the application of transformational leadership theory to schools in order to understand school leadership. Studies examining transformational leadership in schools report results indicating positive effects with respect to school organizations, teachers, and students (Geijsel et al., 2003; Marks & Printy, 2003; Ross & Gray, 2006; Sparks, 2007).

Ross and Gray (2006) said, “Transformational leadership provides a more powerful theoretical framework for interpreting principal behavior than competing frameworks such as instructional leadership” (p. 140). In their study on transformational leadership and collective teacher efficacy involving teachers in elementary schools in Canada, part of their theoretical framework addressing the effects of leadership on teacher commitment was based on the evidence that “School leadership research has found that transformational approaches have positive effects on teachers”(p. 180). Their study found that transformational leadership had “direct” effects on teacher commitment and that “commitment to school mission was the strongest outcome” (p. 193).

The effectiveness of transformational leadership in schools has been described and assessed in studies by Leithwood and associates (Leithwood & Jantzi, 1990; Leithwood & Jantzi, 1999; Leithwood & Jantzi, 2005; Leithwood & Jantzi, 2006; Leithwood, Jantzi, & Fernandez, 1994; Leithwood, Tomlinson, & Genge, 1996; Leithwood, Jantzi, & Steinbach, 1999; Leithwood & Sleegers, 2006). In their 1999 study on transformational school leadership, Leithwood and Jantzi reported their “results demonstrated strong significant effects of such leadership on organizational conditions and moderate but still significant total effects on student engagement” (p. 451). They also

defined transformational leadership in terms of six leadership and four management dimensions. They described the leadership dimensions as (a) building school vision and goals, (b) providing intellectual stimulation, (c) offering individualized support, (d) symbolizing professional practices and values, (e) demonstrating high performance expectations, and (f) developing structures to foster participation in school decision (p. 454). In a later study Leithwood and Jantzi (2005) created three categories for the leadership dimensions of transformational leadership and described them as "setting directions, helping people, and redesigning the organization" (p. 180).

The use of transformational leadership theory to help understand leadership in schools is important because school leadership is one factor that positively influences student achievement. Cotton (2003) stated, "Not surprisingly, researchers find that transformational leadership is positively related to student achievement" (p. 61). As mentioned previously, many factors impact student learning, including student demographics, school culture, and family culture. The present study focuses on the construct of school leadership and what that leadership looks like on a campus that has improving student achievement in science. A review of the literature addressing the link between school leadership and student achievement is presented next.

School Leadership and Student Achievement

Research tells us that effective school leadership positively influences student learning (Cotton, 2003; Day, 2000; Fullan, 2001; Hallinger & Heck, 1998; Hallinger, Murphy, Weil, Mesa, & Mitman, 1983; Harris, 2002; Heck, 1992; Heck & Marcoulides, 1993; Leithwood, Harris, & Hopkins, 2008; Mulford & Silins, 2003; Sammons, Hillman,

& Mortimore, 1995; Wahlstrom & Louis, 2008). In their overview of the literature on successful school leadership, Leithwood, Harris, and Hopkins (2008) reported that "school leadership is second only to classroom teaching as an influence on pupil learning" (p. 27). They also reported that "schools with the highest levels of student achievement attributed this to relatively high levels of influence from all sources of leadership" (p. 35). According to Eberts and Stone (1988), "principal behavior and attributes significantly influence individual student achievement" (p. 291). Marzano, Waters, and McNulty (2005) also stated that "our meta-analysis of 35 years of research indicates that school leadership has a substantial effect on student achievement" (p. 12).

Over the past two decades there has been much debate over the relationship between school leadership and student outcomes (Hallinger & Heck, 1996, 1998; Witziers, Bosker, & Kruger, 2003). Early research on effective schools tended to focus on effective leadership in schools but did not tie that leadership specifically to student outcomes. Studies conducted did not produce consistent findings that school leadership positively influenced student outcomes. Leithwood, Tomlinson, and Genge (1996) pointed out that the limited evidence available today addressing the indirect effects of transformational leadership on student outcomes may be due to the complexity of the analyses involved in such studies. Hallinger and Heck (1998) found that "previously described discrepancies in research results may be explained by the conceptual and methodological tools employed by researchers" (p. 157).

In an effort to clarify the role school administrators, mainly principals, play in student outcomes, Hallinger and Heck (1998) conducted a review of the literature

addressing this area of study for the period of 1980 to 1995. The results of their review indicated the following:

> The general pattern of results drawn from this review supports the belief that principals exercise a measurable, though indirect effect on school effectiveness and student achievement. While this indirect effect is relatively small, it is statistically significant and supports the general belief among educators that principals contribute to school effectiveness and improvement. (Hallinger & Heck, 1998, p. 157)

Additional studies and reviews of the literature support the position of Hallinger and Heck. Karen Cotton (2003) conducted a review of studies published after 1985, indicating that what school leaders do on campuses does make a difference in student achievement. Her analysis revealed twenty-six principal behaviors that she believed contribute to student achievement. Cotton classified these behaviors into five categories. These included (a) establishing a clear focus on student learning with high expectations for all students, (b) developing relationships with teachers, parents, and the community, (c) building a school culture supportive of collaboration, shared leadership, risk-taking, and continuous improvement, (d) improving instruction through the use of reflections, observations, and supporting teachers, and (e) using data to encourage accountability.

Elmore (2006), when commenting about school leadership and student learning in effective schools, observed that (a) school leaders in effective schools had a clear vision of high expectations for student learning coupled with a sense of urgency for improvement, (b) the curriculum was rigorous, and (c) teachers had internalized responsibility for student learning. He also observed a collaborative culture in these effective schools, with classrooms open to visits from colleagues, administrators, or other

interested individuals. Collaborative teams of teachers supported by school leadership are recognized as positively influencing student achievement (DuFour & Marzano, 2009).

Similar findings were produced in work conducted by Marzano, Waters, and McNulty (2005). These educational researchers are associated with Mid-continent Research for Education and Learning (McREL). They have conducted an extensive review of research in an attempt to answer the call for "school leadership that translates into enhanced student achievement" (p. v). In their meta-analysis of the research dealing with school leadership, the authors stated, "Our meta-analysis indicates that principals can have a profound effect on the achievement of students in their schools" (p. 38). The analysis included sixty-nine studies conducted from 1978 to 2001. These studies addressed school leadership and student achievement. Their analysis suggested that the link between school leadership and student achievement is not readily apparent because most research indicates that school leadership from both administrators and teacher leaders influences student achievement indirectly through teachers and other school factors. Waters, Marzano, and McNulty (2004) made the following statements about their findings.

1. *Leadership matters*. McREL found a significant, positive correlation between effective school leadership and student achievement.
2. *We can empirically define effective leadership*. McREL identified 21 key areas of leadership responsibility that are significantly correlated with student achievement.
3. *Effective leaders not only know what to do, but how, when, and why to do it*. McREL researchers concluded that effective leaders understand which school

> changes are most likely to improve student achievement, what these changes imply for both staff and community, and how to tailor their leadership practices accordingly." (Waters, Marzano, & McNulty, 2004, p.49)

Just as the review by Marzano, Waters, and McNulty (2005) defined school leadership as being comprised of both principal and teacher leadership, school leadership is defined for this study as being comprised of principals, administrators, and teacher leaders. When examining literature relating to the role played by the principal and other school leaders, I found researchers frequently include principals, administrators, and teacher leaders when making statements or conclusions about school leaders.

Role of the Principal in Student Achievement

To help frame a look at the role played by the principal or other school leaders, it is important to understand what is expected of campus leaders. Today's school leaders are under increased pressures for accountability and student success, and therefore require a different skill set than in past decades. In her book, *Principal Leadership*, Elaine Wilmore (2002) presented the Educational Leadership Constituent Council (ELCC) standards. The need for standards was recognized by the National Policy Board for Educational Administration (NPBEA) to help that organization's goal of improving school leadership and in response to changed expectations in the roles of school leaders on campuses as well as in response to the increased pressures on these leaders. The NPBEA is composed of 10 professional organizations with a commitment to improving school leadership, including:

1. American Association of Colleges for Teacher Education,

2. American Association of School Administrators,
3. Association of School Business Officials,
4. Association for Supervision and Curriculum Development,
5. Council of Chief State School Officers,
6. National Association of Secondary School Principals,
7. National Association of Elementary School Principals,
8. National Council of Professors of Educational Administration,
9. National School Boards Association, and
10. University Council for Educational Administration. (Wilmore, 2002, p. 9)

There are seven standards resulting from the collaborative work of these organizations.

1. A school administrator is an educational leader who promotes the success of all students by facilitating the development, articulation, implementation, and stewardship of a school or district vision of learning that is shared and supported by the school community.
2. A school administrator is an educational leader who promotes the success of all students by advocating, nurturing, and sustaining a school culture and instructional program conducive to student learning and staff professional growth.
3. A school administrator is an educational leader who promotes the success of all students by ensuring management of the organization, operations, and resources for a safe, efficient, and effective learning environment.

4. A school administrator is an educational leader who promotes the success of all students by collaborating with families and community members, responding to diverse community interests and needs, and mobilizing community resources.
5. A school administrator is an educational leader who promotes the success of all students by acting with integrity, fairness, and in an ethical manner.
6. A school administrator is an educational leader who promotes the success of all students by understanding, responding to, and influencing the larger political, social, economic, legal, and cultural context.
7. A school administrator is an educational leader who promotes the success of all students by substantial, sustained, standards-based experiences in real settings that are planned and guided cooperatively by university and school district personnel for graduate credit. (Wilmore, 2002, pp. 13-14)

These national standards provide a framework for improving school leadership that can be used to guide the development of standards at the state level as well as guide college administration preparation programs. Wilmore stated, “The role of principal has transitioned again from school manager to the school catalyst for success for all stakeholders.” (p. 5)

Another area of importance in understanding the role of school leaders is the knowledge base they should possess when stepping into the leadership role on a campus. Jeffrey Glanz (2006) suggested a knowledge base grounded in best practices in teaching, best practices in curriculum, and best practices in supervision and professional

development. He recommended that school leaders be knowledgeable in research-based best practices in teaching and he described these practices as follows:

1. Reflective practice is a process by which instructional leaders take the time to contemplate and assess the instructional needs of their schools, identify problem areas, and develop strategies for becoming more effective.
2. Preplanning occurs when teachers actively consider learning objectives and other preparatory lesson activities.
3. Allocated, instructional, engaged, and success time are crucial factors in promoting student learning.
4. Wait time increases the amount of time students have to think before responding.
5. Direct teaching refers to the time spent in actual teaching as opposed to nonteaching activities (e.g., collecting assignments).
6. Literacy development (including reciprocal teaching) is essential regardless of what subject is taught.
7. Differentiating instruction refers to the varied teaching strategies employed by teachers to address the learning needs of all students.
8. Divergent questioning encourages deep and critical thinking.
9. Self-assessment occurs when teachers begin to reflect on their teaching methods.
10. Constructivism refers to learning by doing or active learning. (Glanz, 2006, pp. 13-14)

Additional research-based instructional strategies are important for the effective school leader to know. These include (a) identifying similarities and differences, (b) summarizing and note taking, (c) reinforcing effort and providing recognition, (d) homework and practice, (e) cooperative learning, (f) setting objectives and providing feedback, (g) generating and testing hypotheses, and (h) using questions, cues, and advance organizers (Marzano, Pickering, & Pollock, 2001). While campus leaders will probably not be content experts in all subjects, these instructional strategies are applicable to all content areas.

Glanz (2006) also pointed out the importance of the role played by school leaders in the development of the school's curriculum. This practice is collaborative is nature and involves teachers, curriculum supervisors, and the principal. He stated, "Curriculum involves an analysis of all the learning experiences that occur in school" (p.52). If we expect students to succeed academically, designing the most effective curriculum to meet the needs of a diverse body of students requires a basic knowledge of curriculum development.

Equally important is the campus leaders' understanding of the principal's role in supervision and professional development in the school. Glanz (2006) offered the following concepts as important for principals to understand:

1. Clinical supervision is a cyclical process of engaging teachers in instructional dialogue based on three basic stages: planning, observing, and reflection.
2. Action research occurs when principals encourage teachers to think about their teaching and student learning in systematic ways by employing the scientific method: identify a question or problem, pose research questions,

gather and analyze data, interpret results, derive conclusions, and take action to improve practice.

3. Professional development is a process of supporting teachers' work and student learning by systematic, continuous, meaningful, knowledge-based workshops and seminars around collaboratively developed topics.
4. All good principals work with teachers on instructional activities that include planning, conferences, observations, workshops, sharing bulletins and research, inter-visitations, providing resources, demo lessons, and staff development. (p. 56)

When considering the role principals play in school improvement and increased student achievement, Dennis Sparks (2007) focused on leaders. In his book, *Leading for Results: Transforming Teaching, Learning, and Relationships in Schools*, Sparks considered leaders "a category that in schools includes teacher leaders as well as principals and district administrators" (p. xv). His book focuses on his belief in "the leader's role in actualizing human potential and unleashing individual and organizational energy" (p. xiv). According to Sparks, leaders accomplish this by "connecting people to larger purposes and to one another and by cultivating in their organizations transformational professional learning and breakthrough thinking" (2007, p. xv). He made the following statement:

> Leaders matter. What leaders think, say, and do -- and who they are when they come to work each day -- profoundly affects organizational performance… Leaders' thoughts and actions shape the culture of their organizations and set the direction and pace for the professional learning and teamwork that are essential in improving organizational performance." (p. xii)

Sparks offered the following seven leadership skills as representative of the beliefs that help encourage improvement in student as well as adult learning:

- clarity of thought regarding intentions and assumptions,
- deep understanding of important subjects,
- the capacity to create,
- empowering beliefs,
- the concise and consistent expression of those intentions and beliefs in the spirit of dialogue,
- committed listening, and
- continuous innovation in the methods used to achieve our goals. (p. xvii)

Sparks (2007) made the case that if the goal of a campus principal or school leader is for improved student achievement, the principal or school leader should begin by examining themselves to see what they need to improve or learn in order to create the culture for school improvement. One of the keys to school improvement is leader self-awareness and then encouraging the growth of others.

This focus on leader self-awareness is also presented by John Daresh (2006) in his book, *Leading and Supervising Instruction.* Daresh stated:

> Educational leaders who are most successful have a clear sense of purpose of schooling in general. They also have developed clear personal philosophies concerning the nature of the people with whom they work each day. And they have constructed a sense of purpose and reality in terms of the nature of the job of being a school leader in the first place. (p. 4)

Daresh makes the point that “school leaders are important people because they can create the conditions that are necessary to make schools into learning places, not simply buildings where students are ‘warehoused’ each day” (pp. 4-5).

In order to create this condition, the effective school leader must decide individually what supervision is, and what it looks like, as well as what leadership is and what it looks like. Daresh (2006) presented two versions of characteristics of effective instructional leaders. The first example is from the Association of Supervision and Curriculum and is composed of five characteristics of instructional leaders: (a) providing a sense of vision for their schools, (b) engaging in participative management, (c) providing support for instruction, (d) monitoring instruction, and (e) being resourceful.

The second set of behaviors presented by Daresh are from the work of Warren Bennis and Burt Nanus (1985) and include strategies dealing with (a) developing a vision, (b) using effective communication, (c) establishing trust, (d) possessing self-confidence, and (e) focusing on success rather than avoiding failure. With either of these sets of characteristics and strategies, the leader must not lose sight of the most important part of the process, the needs of the students and the importance of encouraging a student-centered campus.

Student Improvement Processes in the Science Content Area

In addition to examining the current research for the role of leadership in student achievement, this study focused on the role of that leadership as it influences student achievement in science. The leadership demonstrated by school leaders is critical to the implementation of what research has identified as the best practices in science. If the improved instructional strategies in science teaching are to be implemented, school

leaders need an understanding of what those instructional strategies look like as well as an understanding of the National Science Education Standards.

In 1996 the National Research Council (NRC), along with the National Science Teachers Association (NSTA), the American Association for the Advancement of Science (AAAS), and other organizations, created the National Science Education Standards (Zemelman, Daniels, & Hyde, 2005). Zemelman et al. stated, "The science standards ask teachers to foster in all students the awareness of science as a dynamic, creative interplay of questions and evidence, data and ideas, predictions and explanations" (p. 145). These standards address four areas of science education: (a) teaching, (b) professional development of teachers, (c) assessment, and (d) science content knowledge. The goals for teaching science in schools as outlined by the Standards state that students should be able to (a) experience the richness and excitement of knowing about and understanding the natural world, (b) use appropriate scientific processes and principles in making personal decisions, (c) engage intelligently in public discourse and debate about matters of scientific and technological concern, and (d) increase their economic productivity through the use of the knowledge, understanding, and skills of the scientifically literate person in their careers (NRC, 1996).

To accomplish these goals, campus leaders must encourage the use of research-based best practices. There is no one way to teach science effectively. An effective teacher is able to decide which of several strategies would be the appropriate strategy to help a student understand a particular scientific concept (Bell, Smetana, & Binns, 2005; Crane, 2005). Badgett and Christmann (2009) recommend deconstructing the national and state standards to guide development of unit plans and daily activities. Standards tend

to be written in broad and general terms and must be broken down into specific, logical, and understandable guidelines for instruction. They stress the importance of viewing instruction and assessment as a "pyramidal structure that proceeds from the simple to the complex, whether we are looking at measurable objectives, paper-and-pen tests, performance-based assessments, or portfolios" (p. 2).

In a meta-analysis of 140 studies focusing on the effects of traditional science teaching strategies as compared to alternative science teaching strategies (Wise, 1996), results indicated that students taught with the alternative science teaching strategies were more successful on science achievement tests than students taught using traditional methods. The alternative science teaching strategies identified as effective science teaching strategies included (a) questioning strategies, (b) focusing strategies, (c) manipulation strategies, (d) enhanced materials strategies, (e) testing strategies, (f) inquiry strategies, (g) enhanced content strategies, and (h) instructional media strategies.

Wise (1996) observed that a common element in these science-teaching strategies is an inquiry-based approach to teaching and learning that requires the student to be actively engaged in the learning process. Students actively construct their own knowledge guided by the teacher. As stated in the National Science Education Standards (NRC, 1996), "Learning science is an active process… Learning science is something students do, not something that is done to them" (p. 20). The National Science Education Standards offer the following standards for science teaching:

1. Teachers of science plan an inquiry-based science program for their students. (p. 30)
2. Teachers of science guide and facilitate learning. (p. 32)

3. Teachers of science engage in ongoing assessment of their teaching and of student learning. (p. 37)
4. Teachers of science design and manage learning environments that provide students with the time, space, and resources needed for learning science. (p. 43)
5. Teachers of science develop communities of science learners that reflect the intellectual rigor of scientific inquiry and the attitudes and social values conducive to science learning. (p. 45)
6. Teachers of science actively participate in the ongoing planning and development of the school science program. (p. 51)

A second meta-analysis by Schroeder, Scott, Tolson, Huang, and Lee (2007) looked at studies conducted between 1980 and 2004 focusing on science teaching strategies and the effect of those strategies on student achievement. This study identified the following teaching strategies to have a positive influence on student achievement:

- enhanced context strategies,
- collaborative grouping strategies,
- questioning strategies, direct instruction, and focusing strategies,
- inquiry strategies,
- manipulation strategies,
- assessment strategies,
- instructional technology strategies, and
- enhanced material strategies. (Schroeder et al., 2007, p. 1446)

The issue for school leaders that surfaces after identifying best practices is how to encourage teachers to implement these best practices. Implementing instructional change on a campus is not always an easy task. In a study by Rowen and Miller (2007) on implementation of three externally created programs for instructional change on school campuses, the researchers compared the success of the implementation and the degree of instructional change achieved by each of the programs used. A key finding by these researchers was that "predictable differences in patterns of organizing for instructional improvement emerged across the schools working with these three programs, and these patterns were found to be systematically related to patterns of program implementation" (p.252).

Just as the effective science teacher decides which of the best practices strategies to use when teaching a science concept to students, an effective principal must decide how to encourage instructional change when needed. As demonstrated in the study by Rowan and Miller (2007), campus leaders must decide if the teachers need a programmed approach that includes specific directions for the change or if they need an adaptive approach that allows for more teacher discretion and autonomy. As their study showed, the approach chosen to implement the desired instruction changes influences the degree of instructional change achieved by the campus.

In their study of a high school department chair, Rigano and Ritchie (2003) reported similar findings about how that department chair encouraged change within the science department. In efforts to overcome barriers to implementing reforms within the science department, the science department chair used leadership skills such as modeling

desired practices, providing teacher support, and setting high expectations for the department. His adaptive approach allowed teachers to implement desired instructional changes as those teachers felt comfortable doing so. Ritchie, Mackay, and Rigano (2006) also examined leadership dynamics in science departments in their study of two high schools. Their study examined how the leadership dynamics in the science department encouraged or discouraged desired changes in classroom practices. Leadership practices used by the science leaders in their study included modeling desired practices and clearly articulating their vision for the science department.

Leithwood and Jantzi (2006) made the observation that "there is a significant gulf between classroom practices that are 'changed' and practices that actually lead to greater pupil learning" (p. 223). They added, "The potency of leadership for increasing student learning hinges on the specific classroom practices which leaders stimulate, encourage, and promote" (p.223).

As mentioned in Chapter I, the present study was undertaken to consider the issue of leadership and student success in science by examining perceptions from school administrators and science department leaders regarding leadership practices and success in science on campuses with improving student success in science.

CHAPTER III

METHODOLOGY

Naturalistic Inquiry

High school campuses are complex entities with countless variables, interactions, and pressures. Because of this complexity and because I desired to understand each campus and its components and interactions with a richness and depth of detail, I felt that a naturalistic study using the qualitative research technique of multi-case studies design was the most effective method of research (Gay, 1996; Lincoln & Guba, 1985; Schwandt, 2001). In a multiple case study, "a number of cases may be studied jointly in order to investigate a phenomenon, population, or general condition" (Strake, 2005, p. 445). For this multiple case study, I investigated perceptions of leadership and student success in science from campus leaders in certain high schools that have experienced sustained student success in science.

Naturalistic studies (Lincoln & Guba, 1985) are characterized by the following beliefs:

1. Realities are multiple, constructed, and holistic as compared to the positivist view that realities are single, tangible, and fragmentable;
2. The relationship of the researcher and the issue is interactive and inseparable as compared to the positivist view that the researcher and the issue are independent; and
3. Inquiry is value-bound as opposed to the positivist belief that inquiry is value-free.

In their book, *Doing Naturalistic Inquiry*, Erlandson, Harris, Skipper, and Allen (1993) stated that "The process of inquiry for the naturalistic researcher becomes one of developing and verifying shared constructions that will enable the meaningful expansion of knowledge" (p. 21). Each person operates within his or her own constructed realities and no two realities are identical. Thus, researchers bring certain constructed realities to the research. In this study, it was my desire to understand the multiple realities of the leaders on the selected campuses as well as to acknowledge the role of the researcher and the interactive nature of the investigation. It was significant to my role as researcher that I brought to the study over eight years of experience as an administrator in public schools and over six years of experience in science education. This experience in public schools, in administrative positions, and in the core academic area of science provided unique insight into the area of the study.

Site Selection

An important aspect of the multi-case studies design is the selection of each case or site. In a naturalistic study, there are several generic considerations for the researcher to address in the site selection including accessibility and gaining entry into the site. For example, is the site accessible geographically or will the research require travel and the associated costs of travel (i.e., food, transportation, and lodging)? Another generic consideration is gaining entry into the site. This refers to the official and unofficial gatekeepers who grant the researcher access to individuals needed for a study or do not grant that access. In my study, the gatekeepers turned out to be the secretaries for the principals. Part of gaining entry and access to the individuals I wanted to interview

involved the development of a rapport with the principals' secretaries and gaining his or her trust. The rapport and trust I built with the campus secretaries helped me gain access to the campus administrators and science team leaders for interviews.

In addition to the generic considerations, I purposefully selected three participant schools based on several factors. All selected schools were secondary campuses of ninth through twelfth grades that met the following criteria:

1. The campuses have experienced an improvement in student passing rates on the science TAKS test that exceeds the state's percent improvement in passing rates for the past three years.
2. The campuses have experienced an increase in passing rates on the science TAKS test exceeding 15 percentage points for the period 2003-2008 demonstrating a history of improvement. Requiring an increase exceeding 15 percentage points in the passing rates excluded campuses with a history of high passing rates and no growth. As stated earlier, much research has already been completed studying these high achieving campuses.
3. The science department leaders such as department chairs and grade-level team leaders have held their positions during the most recent three-year period of increasing passing rates and were available for interviews.
4. The administrators have held administrative positions on their respective campuses for the most recent three-year period of increasing science performance and were available for interviews.
5. The campuses were within the Texas Educational Service Center (ESC) Region IV in order to strengthen the commonality of support systems and

training available to each campus. ESC Region IV is the largest educational service center in Texas serving 54 school districts in eight counties with over 150 high schools, over 83,000 educators, and over 1,000,000 students. These school districts are located in urban areas such as Houston ISD as well as in rural areas such as Hempstead ISD.

Data needed for the selection of campuses was publicly available from the Academic Excellence Indicator System (AEIS) reported through the Texas Education Agency (TEA) and campus websites. Campuses with a TEA rating of *Exemplary* were not selected because considerable research on exemplary schools already exists. Campuses with a TEA rating of *Unacceptable* also were not selected because considerable research on low-performing campuses has already been completed. Pseudonyms for the campuses and participants were used to ensure confidentiality. The sites selected were Addison High School, Whitney High School, and Turner High School. Table 1 provides information on each school.

Table 1. *Summary of Information on Selected High Schools*

	Addison High School	Whitney High School	Turner High School
Age of Facility	1964 Renovated in 2004	1955 Renovated in 2001	1974 Renovated in 2000
# of Administrators	9	6	11
# of Students	2500	1700	2900
# of Teachers	170	150	170
# of Science Teachers	20	14	20
Adm/Teacher Ratio	18 to 1	25 to 1	15 to 1

Data Collection

Data for this study was collected from semi-structured in-depth interviews (see Appendix A, Informed Consent Form; Appendix B, Debriefing Statement; and Appendix C, Interview Protocol) with campus administrators, science department chairs and grade-level science team leaders at each site. Four individuals were interviewed from each campus. When selecting the individuals to be interviewed it was important to keep in mind that "the attitudes, orientation, and position of the interviewee are extremely important in shaping the total picture of the context" (Erlandson et al., 1993, p. 91). A good choice for an interviewee is someone "who can express thoughts, feelings, opinions, his or her perspective, on the topic being studied" (Merriam, 1988, p. 76). The interviews took place on each campus in conference rooms and science classrooms.

These interviews were semi-structured and were audiotaped. I also took handwritten notes in addition to the audiotapes to help ensure quality and reliable data. I felt handwritten notes were necessary as a back-up in the event the recorder

malfunctioned. Each interview was transcribed as quickly as possible following the interview in order to capture relevant details while the interview was still fresh. In addition, I did not conduct more than two interviews on any one day to avoid any confusion that might have developed when multiple interviews are conducted by one researcher. Even though the results of this decision meant I made two or three trips to each campus, the interviews stayed crisp in my mind and I had the time needed to record my impressions of each campus.

An unexpected benefit of audiotaping each interview was the ability to listen to the interview multiple times. This allowed me to reflect on the interview while listening to the recording of it, thus deepening my understanding of the collected data. It also ensured that everything said during the interview was captured on tape. Any names used or recorded were replaced with pseudonyms for confidentiality purposes. Another important step in this process was summarizing the data as it was collected and conducting member checks to improve the trustworthiness and credibility of the study (Lincoln & Guba, 1985). Member checking in the form of follow-up phone interviews and emails were conducted as needed for clarification purposes or follow-up questions.

Data Analysis

Interviews were transcribed and recorded daily. Each interview was transcribed word for word and then examined for accuracy. This data was then broken down into units, categorized, coded, and analyzed for emerging themes and sub-themes. A unit of data is a section of the text that contains a single item of information and makes sense even if read outside of the context of the interview (Gall, Borg, & Gall, 1996). Sorting the

units generated through analysis of the interview transcripts produced categories resulting in the identification of themes and sub-themes. Codes were assigned to each school and to each person interviewed on the campus. I used a computer database as a tool for compiling and sorting the data. It is important to be aware that this process is not a linear process starting with one piece of data and flowing through to conclusion. Instead, this analysis involved the process of categorizing information, determining emerging themes, and then re-categorizing the information to support any newly emerging themes as the analysis continues. Themes and sub-themes were analyzed with respect to constructs found in transformational leadership theory.

Theoretical Framework Used for Analysis

As stated in Chapter I, this study utilized a frameword of transformational leadership theory based on the work of Leithwood and Jantzi (1990, 1999, 2005). In their 2005 review of research on transformational leadership studies published between 1996 and 2005, Leithwood and Jantzi pointed out that "transformational leadership is an extremely popular image of ideal practice in schools…" (p. 178). In this same review of research on transformational leadership, they made the comment that "conceptions of transformational leadership have become increasingly more complex, nuanced, and sensitive to context…" (p. 179). They presented three broad categories of transformational and one category of transactional leadership. The transformational leadership categories were as follows:

- Category One is building school vision and goals, which Leithwood and Jantzi referred to as "Setting Directions." Included in this category was the

transformational leadership behavior of setting high performance expectations.

- Category Two is providing intellectual stimulation, which Leithwood and Jantzi referred to as “Helping People.” This category also included transformational leadership behaviors that provided individualized consideration and/or support for others as well as modeling key values and practices.
- Category Three is building collaborative cultures, which Leithwood and Jantzi referred to as “Redesigning the Organization.” This category also included the transformational leadership behaviors of helping to create organizational structures to foster collaboration, and building productive relations with parents and the community. (Leithwood & Jantzi, 2005, p.181)

Trustworthiness and Credibility

In order to insure trustworthiness and credibility, I used several techniques including but not limited to peer debriefing, triangulation of data, and member checking. Peer debriefing is a technique used in naturalistic studies to establish credibility and is described by Lincoln and Guba (1985) as “a process of exposing oneself to a disinterested peer… for the purpose of exploring aspects of the inquiry that might otherwise remain only implicit within the inquirer’s mind” (p. 308). In this process, the researcher discusses the investigation with someone outside the investigation. This outsider pays thoughtful attention to the researcher’s position and process in the study, the direction of the study, and recognition of any emerging themes.

The individual I used for peer debriefing was a colleague who has over 20 years of experience in the public school system ranging from science classroom teacher to campus administrator to district science administrator to college instructor and supervisor of new science teachers. Her insight into people as well as her understanding of leadership and science teaching issues added considerably to the study.

The technique of triangulation of data also improves trustworthiness and credibility because it involves the use of multiple and different sources of information. For this study, multiple sources of information refer to interviews with more than one individual on the same topic. In this study, individuals interviewed included campus administrators and science department leaders.

Member checking is another technique I used for trustworthiness and credibility. This technique was described by Lincoln and Guba (1985) as follows:

> The member check, whereby data, analytic categories, interpretations, and conclusions are tested with members of those stakeholding groups from whom the data were originally collected, is the most crucial technique for establishing credibility. (p. 314)

Throughout this study, I checked formally and informally with those interviewed and received feedback on the data they provided. Member checking is both formal and informal, and the procedure was performed throughout the study (Erlandson et al., 1993). For this study, I performed member checks informally during each interview and at the end of each interview by summarizing and restating some of the comments made during the interview as well as the implications of those statements. This process gave the interviewee an opportunity to correct any errors of facts or interpretations. In addition, at least one person interviewed on each campus became a contact for another form of

member checking related to verifying interpretations and data gathered during previous interviews. Any comments or suggested changes were discussed and agreed upon before being added to the data. I also checked for accuracy in recording and interpretation by listening to the audiotapes of the interviews several times.

Because I established relationships and built trust with individuals who were interviewed, each campus contact was very willing to return comments and suggestions in a timely manner. In several of these instances, additional data surfaced that did not come out of the original interviews. It seemed that as the relationships developed and trust increased, the participants were more willing to share their thoughts and reflections.

Summary

I feel the use of a naturalistic study enabled me to gather data that accurately reflected the perceptions from campus leaders related to leadership on the campuses and how that leadership helped the campus achieve student success in science. I have presented the case study for each of the participant high schools in the next three chapters followed by an analysis of the information obtained. By examining the perceptions from campus administrators and science department leaders, insight may be gained concerning the role leadership plays in student success in science.

CHAPTER IV

CASE STUDY ONE: ADDISON HIGH SCHOOL

Background of Addison High School

Addison High School is located in an older section of a small city southeast of Houston. As I approached the first of three high schools chosen for this study, I was struck by the age of the neighborhood. The homes were over fifty years old but appeared well maintained and the surrounding area was full of huge old trees. The neighborhood was well kept and it did not give me the feeling of neglect or blight that is so common in the older areas of other cities.

Addison is the original high school in the Addison Independent School District, which opened a second high school five years ago. When the new high school was built, renovations and updates were also made on Addison's campus, giving it the appearance of a new school. Recently a new academic building was added to replace a former elementary building on the campus.

Addison High School's campus is a sprawling group of buildings that once housed the entire school district including the administrative offices, elementary schools, and junior high. Over the years as more schools were built in the new areas of town, the administrative offices were moved into new facilities, the elementary schools were moved to several new locations, and the junior high was moved to another part of town. Academic departments from the high school were moved into the vacated buildings and today the campus looks more like a small college campus with many separate buildings than a typical high school. One of the teachers interviewed mentioned that while the

sprawling campus provides plenty of room for the 2500 students, it does make it more difficult for teachers in different departments to interact with each other.

The campus serves an ethnically diverse student body with an ethnic breakdown of 40% Hispanic, 50% White, 5% African American, and 5% Native American or Asian/Pacific Islander. Of these students, 37% are classified as economically disadvantaged. This compares to the state's ethnic breakdown of 41% Hispanic, 41% White, 15% African American, 3% Native American or Asian/Pacific, and 40% economically disadvantaged.

Organizational Structure of Addison High School

The high school is organized into 26 departments staffed by 170 teachers. These teachers are supported by an administrative staff comprised of one principal, one associate principal, six assistant principals, and six counselors. The science department has 20 science teachers with classes in Biology, Chemistry, Physics, Aquatic Science, Environmental Systems, and Integrated Physics and Chemistry (IP&C), as well as advanced and dual credit science classes in Biology, Chemistry, and Physics. The leadership team for the science department consists of a department chair and team leaders for Biology, Chemistry, and Physics. The organizational structure of the school is illustrated below in Figure 1.

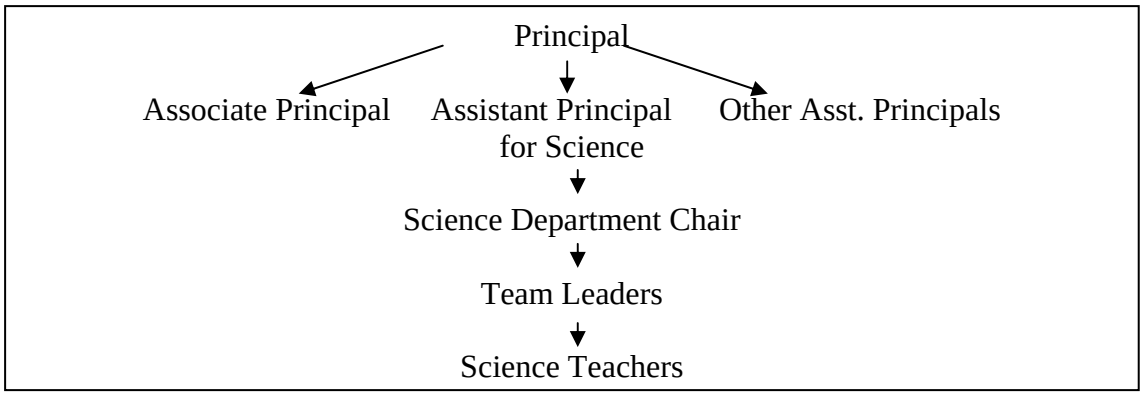

Figure 1. Organizational structure of Addison High School.

Student Success in Science

As mentioned earlier in this report, student success in science for this study is defined as the students' ability to pass the state-mandated TAKS test in science. The schools selected for this study had to meet the following parameters with respect to student success in science.

- Campuses have experienced an improvement in student passing rates on the science TAKS test that exceeded the state's percentage of improvement in passing rates for the past three years.
- Campuses have experienced an increase in student passing rates on the science TAKS test that exceeded 15 percentage points for the period 2003-2008, demonstrating a history of improvement.

Interviews with Personnel at Addison High School

The increase in student achievement in science at Addison High School as evidenced by the above parameters was not an accident. To understand better how these increases happened at Addison High School and to get their perceptions on the role

leadership played in the student success in science, I interviewed the campus principal, the science department chair, the physics team leader, and the biology team leader.

Addison Principal

The principal at Addison has over 25 years of experience as an educator, with his most recent being eight years as principal of Addison High School. He began his educational career as a science teacher in a large Texas high school. When asked to describe his leadership style, he responded

> I think I'm participatory. I like to get involved in what's going on and be there. I am not one to sit back. I get bored very quickly with a certain task and I am not a details-type person. I like details but I don't like to perform the details. I try to broaden and try to get out there and get involved with everybody, whether it's fine arts, whether it's math, whether it's chemistry, I try to get out there and be involved in that. And I'm not above it all, stepping into a classroom and teaching a class or covering for a teacher that has a family emergency that has to leave. In fact, I love to do that. I love the classroom.

At another point in the interview, the principal mentioned one of his beliefs about leadership and stated:

> I believe that as a leader, responsibility is a major part of leadership. As an administrator, the responsibility lies with you. I've got to accept the blame or the credit, whichever it is. I tell my team all the time, sometimes you have to look in the mirror for the solution or answer to a problem and not out the window. And when changes are needed on a campus, I've got to get my people to do what they need to do. I think the key to good leadership is getting people to work for you.

In the interview, the principal came across as a very strong leader with vision, setting clear goals for the campus and demonstrating high performance expectations for his teachers. He described how he was not hesitant to address areas needing improvement. He explained:

> When I approach a teacher on a situation, it's more of a what can we do to get us there. It's not, you know, I'm not happy with your performance, I'm gonna fire

> you. It's more of a 'this is where we are, this is where we need to be, so what do we need to do to get you there.'

The principal explained that some of these conversations are the result of observations made during "data walk-throughs." These data walk-throughs are conducted by administrators, department chairs, and team leaders to "take a snapshot of what's going on in that classroom at that instant." Classroom teachers can also be part of the process if they want to volunteer to participate in the walk-throughs. He described the process as follows:

> Very quickly just go in, see what you got, see what the kids are doing, see what the teacher is doing, and see what activities are going on in the classroom. Try to get a grasp as far as what level of engagement is going on, in terms of what level of instruction is going on, and then walk out the door.

He also explained that these walk-throughs are more for quantity than for quality so that he can get an accurate representation of what is going on in the classrooms. He stated:

> We want a lot of data because I want to be able to sit down and show my teachers what is going on in the classrooms. For example, during 1200 data walk-throughs, a certain percentage of teachers were up and engaged with students, a certain percentage of teachers were on their computers, a certain percentage of students were taking an exam, a certain percentage of students were completing a worksheet, or a certain percentage of students were working in learning groups.

The principal made the point that he believed every teacher has a desire to do the right thing in the classroom consistently, but the teachers might not realize how much better they could be. He also uses the data in conversations with teams (with no teacher names used) to discuss how the classrooms should look. While setting high expectations for the teachers, the principal also discussed the importance of providing support. He

made the point that when you increase the expectations for teachers you also need to increase the support for teachers. He added:

> I pride myself when I hire my staff, and particularly my administrative and clerical staff on this campus. I will tell everyone I hire in that capacity that we're nobody. Those teachers are the ones in the ranks. They are the ones that are turning out the product. Our job is to give them what they need to turn out that product. And if we're not doing that, then we're not doing our job.

Continuing with the same theme of offering individualized support to teachers, the principal mentioned that he encourages an "open door" policy. He stated:

> If you've got an issue, you can go directly to an administrator. There's not that rigid hierarchy set up that they have to go, you know, to a team leader, to a department chair, to an administrator. Most of them just walk into their administrator's office and say, "Hey, I've got a problem here. How can you help me with it or what can I do?"

When asked specifically about his perceptions of leadership and the role it plays in the science department and with science teachers, the principal described the science teachers as very independent individuals and mentioned that before he arrived on the campus, the department did not have much leadership and did not think globally. He commented:

> I think the biggest transition we have made on this campus is to get our science teachers to look a little more globally, to realize that the biology team can help the physics team, can help the chemistry team, and that they all have to work together for a common goal -- and that goal is to get our kids where they need to be in the different fields of science. We are growing our teachers into leaders in their teams and leaders in the classroom and that is resulting in student success.

The principal also stressed the need for collaboration not just within the science department but also within each team in the department. He expects each science team to develop a common curriculum based on the state-mandated TEKS and follow a common

scope and sequence with common assessments. This was not happening before he became principal. His background in teaching science may have helped build credibility with the science teachers when he encouraged them to plan together and build common assessments. He stressed that while he does not expect everyone to teach the same way or use the same instructional techniques he does hold each teacher accountable for teaching the curriculum and giving common assessments. The principal stated:

> They're gonna be accountable for those areas. We share our data openly. I have no issues with sitting down with my teachers and laying it out there. And I will tell those teachers -- I have had this conversation with many -- your student scores are down here at the bottom. They don't seem to be getting it. Why is that? I expect more of you. I need these scores to be better.

He also stated:

> I think teachers genuinely think they are doing a good job all the time. Without the data presented to them, they have nothing to base that on other than how they feel about what they've taught. There have been numerous times where a teacher sat across the table from me and said, "I had no idea my student scores were so low. I thought I was on top of things. I see what I need to work on.

I got the impression that setting high performance expectations for his teachers was extremely important to this principal but that it was equally important to do this collaboratively and not in a threatening or authoritative manner. The principal pointed out this process is not a 'gotcha'. He said:

> I think it's important that this is not a 'gotcha'. The teachers have to feel comfortable with sitting down and talking with you and not feel defensive. I want to hear their input and I want to hear what they have to say by all means.

Science Department Chair

The science department chair has over 10 years of experience as a chemistry and physics teacher and a degree in marine science. Marine science is a multi-disciplinary

science major because it focuses on a combination of biology, chemistry, physics, and geology. At the beginning of the interview he shared how much he enjoyed science as a child. He stated that even now he rarely reads any fiction books for fun but mainly reads non-fiction science-related books. In spite of this love for science, he worked as a sales manager for 10 years before entering the teaching profession. When asked why he decided to teach, he explained that as a sales manager he traveled a lot and never seemed to be at home with his family. He commented:

> My job before this was a lot of travel and I was missing out on a lot of my two boys' lives so I just decided to find another job, looked around, and thought about teaching. I was a substitute teacher first and then got alternatively certified with extra training in science. My first job was teaching chemistry at this high school and I've been here ever since.

He has been a department chair for the past five years. When asked about his leadership style, he commented:

> I walk around. In my previous life, I was in management and I was more of a walk around kind of manager. I'm still that way. So, on my off periods I usually cruise the halls and see what's going on. You know I'll poke around and find teachers in their conference periods and ask them if they need help with anything. I don't know that I'm all that helpful to anyone, but I think just letting them know that you're around is helpful to them. This position as department chair doesn't have a lot of power. I mean I get to sit in on interviews and make recommendations about hiring someone, but my hands are tied if a teacher isn't performing. It's just really frustrating not to be able to do anything about a teacher who is consistently low performing without all the paperwork of a growth plan. The business world is different. You don't have all that paperwork.

In addition to helping teachers during conference periods, this department chair is also the liaison between the district and the campus and serves on the Science Council. He expressed considerable frustration with this particular responsibility because much of

it involves learning about new district initiatives and taking the information back to the campus. He commented:

> We are usually the first ones to get trained on whatever new thing it is and then we are expected to go out and 'sell it' to our campus and make sure it gets implemented. As long as I don't think it's just crazy, I try to give it a fair shot and try to convince the teachers to give it a fair shot and keep a good attitude about it. I try to intercept bad ideas but I also try to be a team player. Last year was a little frustrating because they gave us so many new things to do all at once and I knew most of our teachers were not going to like it.

When I asked him for an example of something the district wanted to implement on campuses that he thought his teachers would not want to do, he mentioned the 5-E lesson plan. He said, "Probably the least movement we got was on the 5-E training because teachers just didn't have time to rework all their lesson plans to make them fit." I asked if he felt any sense of responsibility to help the teachers figure out how to make it work and he responded that whether or not the teachers cooperated was not his 'thing' and that he mainly brought the new initiatives back to campus from the district but didn't worry about implementation. He expressed concern that the district level administrators were getting a little too controlling. He said the district math people were starting to put the secondary math departments into a very regimented and scripted curriculum. He does not want to see this happen to the science department. He commented:

> I think the science department is fairly high functioning in working as teams. We like to say, "This is what you have to teach but how you teach it is kind of your own thing." You know how your relationship is with your students and you know how your personality is. So we tell them you need to teach this concept however you see fit. We don't tell them exactly how to teach. I think that as long as we continue to have success with our kids, they will probably leave us alone.

This statement supports the previous comments from the Addison principal when he was discussing his expectations from the science teachers. When asked to describe the leadership style of his principal, the department chair responded:

> The principal before our current principal was very much a consensus person and was very much into forming committees to talk about something and come to consensus and then that's what we would do. Our current principal is more direct in the sense that he says, "This is where we need to be," but he doesn't tell anyone how to do it. He just wants it done and he doesn't really seem to care how it gets done, just wants it to get done. I guess he's given his assistant principals a lot of responsibility for pushing the different departments that they are in charge of to do things as far as their accountability ratings.

When we talked about other responsibilities that he has as science department chair, he stated he also was the 'budget manager' and keeps track of how much money each content area in the department spends on supplies. He does this not as a watchdog to tell the teachers when they have spent too much money but as liaison between the financial secretary and the department. Science instruction uses many consumables and he wants to make sure the teachers have what they need to teach. He also attends department chair meetings with the principal once each month and is responsible for taking information back to the department. With respect to the student success in science, I asked him about the role leadership plays in that success. He said:

> I guess you could say that the administrators give us what we need and leave us alone as long as we get the numbers. We do a lot of benchmarking, and we have very carefully aligned our curriculum with the TEKS, which is aligned with the TAKS and it's worked out.

I asked the science department chair if he could think of anyone else's leadership that might have had an impact and he responded,

> Not really. We've been working and reworking our curriculum and because we've had teachers doing it all along, I think there's a decent amount of buy-in that the

> curriculum is reasonable and something we should be able to do. There was a time that I wrote the all the curriculum for chemistry, all the curriculum for physics, and the entire curriculum for IPC. I felt bad about it because I was writing it the way I wanted to teach it but I didn't know if that was the way some other teacher would like to teach it. But we've been able to cycle some other people in and have their input and it's changed. It's morphed into what we currently have and I think it's a pretty good plan. As long as we beat math, I'm happy. You don't ever want to have the lowest scores on TAKS because that's when you get much more attention.

I also asked if he had ever had any kind of leadership training or if there was any kind of leadership training for the campus or the district. He said:

> We have some people who go to the 'High Schools That Work' conference every four or five years. My home schedule has always conflicted with it but I've kind of wanted to go. But that's the only thing I can think of for leadership.

As we talked about the Addison High School students' success in science, he made the following comment:

> I feel like you're asking me what it is we are doing that's so great and I'm thinking we are just doing what we should be doing as teachers. We're working at improving our teaching and we're dragging our kids up with us. My goal is just to make sure we keep improving and that means we have to keep improving our teaching. For example, I have been teaching Physics for five years now and I realize that my first year in Physics, I taught some of the Physics content in a very bad way. I exaggerated some misconceptions and taught things in ways that were not correct and so I have worked on that every year. And I'm not alone in my department in teachers trying to improve the way they teach things each year. We've got a few duds that are still in that worksheet mentality but not many. Most of us are here because we love teaching. I teach because it's fun and because I enjoying pushing myself to be a better teacher.

Biology Team Leader

Growing and becoming a better teacher is a theme I also heard from the biology team leader. Like the department chair, the biology teacher worked in what he called the

'real world' before becoming an educator. He explained that he had always wanted to teach but did not feel he could afford to if he wanted to support his family. He said:

> I finally reached a point in my life where I was able to do something I've always wanted to do, which was teach, which is a passion of mine. Problem is, and everyone in education knows, it's hard to make a living in education. So I was finally at a point financially when I sold my business where I was able to go and start teaching. I have been teaching for five years now and was in my mid-40s when I started. Always loved, just loved science. I majored in science in college. I mean this has always been a passion of mine.

I asked him what his role as biology team leader was like and he shared that it has changed over the past few years. Initially it was difficult because he was asked to be biology team leader at the end of his first year of teaching. He stated, "It was a challenge because my first year there was some animosity with some teachers going, well, why is this guy, you know, who is he. He doesn't even know how to teach." However, he said he remembers looking forward to the challenge and he knew the department needed some help and some new ideas. He commented:

> My main concern was getting the biology department on the same page because everybody was pretty much doing whatever they wanted. And nobody was sharing with anybody. The problem was there wasn't really a department. I mean the team leader was a coach and he just didn't have the time. I'm not sure what he did except that he left everyone alone and didn't ever seem to be around. The next step I went on to was to standardize our unit tests and benchmarks throughout the department so all the teachers -- we know where all the kids stand. We know where they are academically and we can look and say "How are your kids doing on this?" or "How are they doing on that?" and we can share strategies that work with our kids. I pushed very hard to change the mentality of the benchmarks and to use the results not to judge the teachers but to gauge the progress of the kids.

In addition to raising the expectations for the biology teachers and encouraging the development of a team, the team leader also felt the need to grow personally as a teacher in order to encourage others to do the same. He said "and so I became like a

sponge. I went to every workshop I could get my hands on -- and I shared what I learned." He is also currently working on a Masters degree in education. He commented:

> When I took the research class, I spent weeks doing research on technology for use in the classroom. I mean I spent weeks on it. I really enjoyed learning how to do the educational research. It's important because if you're going to convince other teachers of doing something, you have to be able to show the data that will support your claim that, "Hey, this is good. This is something good that will benefit the students." And if you don't know how to do the research, you're not able to present that information. I mean, everything in education is supposed to be research-based so it's important to me to know how to do the research.

When I asked for some examples of the growth in his department, he stated that much of it was related to instructional strategies:

> We look at instructional strategies all the time, all the time. And we're always bringing in new ideas and new ways to teach. One of the things we learned about this summer is how to use music in the classroom. Actually, of all things, it's rap music that we're going to be using. We've also brought in and now all our teachers use Cornell notes with the kids. I'm also one of the district's presenters for a teaching strategy called 'Thinking Maps' and I'm also a district presenter for the Interactive Notebook that we'll be using with kids. And I'm going to be one of the trainers this fall for using Wikis and I-Pods in the classroom. I got that from the research I did for my research class.

After discussing some of his other classes in his Master's program, I asked him if he had taken any classes relating to leadership in education and he said that he is focusing on curriculum and instruction and did not know if he would have a class in leadership. I asked him for his perceptions of the role leadership played on his campus and student success in science. He stated:

> Leadership plays everything. I think that was one big problem in the department. There was no leader. There was no one to pick up the banner and say, "This is what we are going to do" and so I think every teacher was kind of going through the motions and living in their own little realm within their classroom, and there was nobody to actually consolidate it all together and lead the team. And leadership -- I've been a leader my entire life. That's just something I've always done. And I always believe that you lead by example. You have to earn the

> respect and earn the credibility in the eyes of the other teachers if you want them to follow you. And you have to be receptive to their ideas and be willing to listen. I strongly believe you have to encourage the teachers you are working with because some of them have been in their little box for a long time and you are asking them to get out of it and take some risks. You have to get them excited -- instill that energy in your team. I hate to say it but no matter how bad my day is, I have to put on this game face and bring the excitement. And I have to say, everyone has come along pretty good.

I asked if any teachers had been particularly difficult to get on board with his plan. He shared that the most difficult teacher to get onboard was one of the coaches and felt that it was more a matter of lack of time with the biology team rather than any philosophical differences about teaching. He said:

> You know, being a good teacher takes time. And I'm not criticizing coaches. I'm just saying that coaches have it a little harder than the rest of the teachers because they're just not there when we have some of our conversations about new things we want to try in the classroom.

I asked him if he had seen similar situations on other content teams in the school and he said he had not. However, he added:

> We have very, very little contact with other teams, which is to me a huge, huge disadvantage. There's so much collaboration that could be going on between science and math, between science and English. There are just so many things that we could do together if we just kind of coordinated our teams. But this campus needs to work probably harder than other campuses because we are all in different buildings and so it's so easy just to look at your department and not think or worry or have any concerns or even contact with other departments. There are a vast majority of teachers I have never seen because they are in different buildings.

Physics Team Leader

The physics team leader is a young woman who has been teaching at Addison High School for the past four years. When asked what made her decide to teach science she explained that her original plan was to get into medical school. She explained:

> Well, I was a science major in college since I was planning to go on to medical school but then when I was graduating, my mom got sick. And then my dad -- he had his own business -- stopped working to be with her. So I was like somebody in the house has to have an income. My mom helped me and we looked and found a science position open here at the high school. I graduated from this high school so it was easy to see myself teaching here. I applied, got the position, and I liked it a whole lot better than I was expecting I would and I've been here over four years now. It probably helped that my mom is also a teacher. She teaches kindergarten in the district so I sort of had an idea about it -- but teaching physics at the high school is quite a bit different than teaching kindergarten at an elementary school.

We talked next about her role as physics team leader and I asked her to give me an idea about what that was like and to describe her responsibilities. She explained that she is more of a "getter" than a "leader" because she mainly "gets" things for others on the team and makes sure they have what they need. She also reminds everyone about the curriculum and the scope and sequence so that they finish each of the units on time. She explained:

> I just kind of oversee and make sure they are taken care of and that they are doing what they are supposed to be doing for the most part and that they have their supplies. It's not really an authoritative position as such. It's just a reminder that they should be to a certain point in the curriculum by Friday or close to finished with something else by next week. And I just kind of keep those deadlines in my head. And then we have the benchmarks, too. I make sure everyone knows about those and when we have to give them.

I asked her to think about the leadership on her campus in general and describe for me the role it played in the student success in science. She commented:

> I would say we look toward our department head for leadership more so than our team leaders. And the assistant principal over the science department, too. We have certain people who are good at things. Like if you have a computer question, pretty much everyone knows to email a couple of people. And that's more the practical leadership I think than figureheads to us. Because it's not really about -- I think when you are a teacher, everybody knows what they're supposed to be doing, and it's kind of like that's what your professional job is. But it's also a resource thing. Where do you get this resource from when you need it, and who

> do you go to when you need help with this. Those are leaders that are more practical, at least in my eyes.

Her explanation of what she calls 'practical leadership' was interesting. She seemed to have a different concept of leadership than others. This could be because this team leader came straight to teaching from college unlike the science department chair and the biology team leader who both had experience in the business world prior to teaching. She has had no leadership training either as a teacher or to help her improve as a team leader. However, she does have a sense of professionalism related to teaching. Because she does not seem to have the same concept of leadership as the other leaders in her department, I asked if she felt the science department operated in the same way as other departments at the high school. She responded:

> I don't really know. The science department as a whole interacts with each other but as far as campus wide -- we really don't have a lot of interaction. We have meetings at the beginning of the year and at the end of the year but that's pretty much it. We each have our own building and you really don't leave your box during the day. This is a huge campus and that's good because there's plenty of room for all the kids but it really makes it hard to have any kind of relationship or collaboration with the other departments on campus. A friend of mine who teaches physics at another high school works a lot with her English department and they help her with teaching science vocabulary in the English classes and stuff like that. I think it would be neat to do something like that here.

When I asked her about the students in the science classes, the success they have had, and the role leadership played in that success, she said the most important thing the school's leadership did was to make sure they had the materials they needed. I asked her what she believed encouraged the students' success and she explained that it was probably two classes that struggling students are required to take. She stated:

> I think the two biggest things have been the IPC class and the Environmental Systems class. I mean we do the tutoring and the vocabulary and the word walls

> and the pullouts like everyone else but I think the biggest difference for our kids are those two classes.

I asked her what was so special about these classes and why it had made such a difference to their students. She described the classes for me:

> IPC is taught pretty much on the TAKS level. We teach physics for half a year and then we teach chemistry. It's the introductory level for everything. They're introduced to vocabulary they may not have seen before and they're introduced to concepts, especially in chemistry. Most of the physics they are comfortable with. I mean, Newton's laws haven't changed and they've seen that since fifth grade. But the chemistry is new. So we basically introduce them to all the concepts that they will see on their TAKS test. And we go beyond that to an extent. The environmental systems class is the same. It has chemistry and physics and a lot of emphasis on the nature of science but it also focuses a lot on the TAKS. If a kid is struggling in science, they'll probably end up in one of these classes.

At the end of the interview I asked if there was anything else she wanted to share that I had not thought to ask. She said we had not talked about technology and she would like to see more technology used in the classrooms to teach science. She shared that this year for the first time she will have a projector in her room that she can use to show clips or links to the Internet. She commented:

> I love the Internet. I go to the Internet for everything. A good friend of mine teaches in another district and she and I spend time together on the weekends searching for ideas to use in the classroom. Like the interactive notebook, that's a district initiative, and when we looked it up on the Internet, we found ideas for how to use them in the classroom -- techniques and methods. I don't want to stand at the white board and lecture all day. I want to do different things. I want to incorporate a lot of technology. Kids know a lot of technology so I want to use that to teach science.

Summary

When I analyzed the results of the interviews with campus leaders, several themes emerged as important to the student success in science. For example, the principal set a

very clear vision and goals for the school. He also set high performance expectations for the teachers and high expectations for the students but provided unconditional individualized support to help accomplish those expectations. Teachers were able to use their own judgment and experience in deciding how to deal with challenges but also understood they were accountable for those decisions. The themes that emerged during the analysis included (a) clear vision and goals, (b) unconditional individualized support, (c) high performance expectations for teachers and for students, (d) modeling new practices, (e) importance of teams, and (e) open door policy from administrators. These themes will be discussed in Chapter VII when analyzed with themes developed from the case studies of the other high schools included in this study.

CHAPTER V

CASE STUDY TWO: WHITNEY HIGH SCHOOL

Background of Whitney High School

Whitney High School is the only high school in the Whitney Independent School District, located in the small town of Whitney, Texas, on the outskirts of Houston near a major refinery. As I traveled a new highway to reach the school, I was amazed at all the new construction. I passed a new shopping mall, a new junior college, and a new hospital. The neighborhood around the high school is one of small, older homes, but it is well maintained. The high school building itself was built in 1955. It is a low, one-story building with an incredibly large parking lot on the side. The original high school building is nearby and is currently a middle school campus. Across the street is a huge football stadium. I feel certain the stadium lights can be seen for miles on Friday nights when the football games are at home. Also across the street is a new city hall building next to a well-manicured city park. The entire area seems to be growing. During one of the interviews, an administrator mentioned that a new high school is under construction in the same area and would be opening in two years to replace the existing high school building and provide additional space for the expected increase in student enrollment.

Whitney High School has slightly over 1700 students and serves an ethnically diverse student body. The ethnic breakdown of the school population is 45% White, 34% Hispanic, 20% African American, and 1% Native American or Asian/Pacific Islander with over 45% of the student population classified as economically disadvantaged. This

compares to the state's ethnic breakdown of 41% White, 41% Hispanic, 15% African American, 3% Native American or Asian/Pacific, and 40% economically disadvantaged.

Organizational Structure of Whitney High School

The students of Whitney High School are served by one principal, one associate principal, four assistant principals, four counselors, six instructional specialists, and 150 teachers of which fourteen are science teachers. The associate principal and each assistant principal are assigned to one of the core content areas of Math, Science, English/Language Arts, and Social Studies. The associate principal is responsible for the science department. Each content area also has a department chair selected by the principal. In the science department, rather than team leaders, this campus has a lead teacher designated for each area of science including Biology, Chemistry, and Physics. The organizational structure of the school is illustrated in Figure 2.

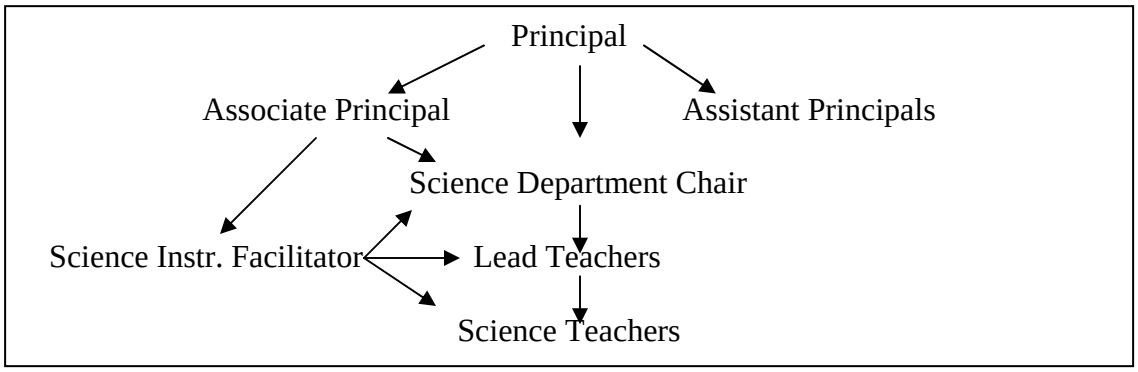

Figure 2. Organizational structure of Whitney High School.

Student Success in Science

As mentioned earlier in this report, student success in science for this study is defined as the students' ability to pass the state-mandated TAKS test in science. The schools selected for this study had to meet the following parameters with respect to student success in science:

- Campuses have experienced an improvement in student passing rates on the science TAKS test that exceeded the state's percentage of improvement in passing rates for the past three years.
- Campuses have experienced an increase in student passing rates on the science TAKS test exceeded 15 percentage points for the period 2003-2008, demonstrating a history of improvement.

Interviews with Personnel at Whitney High School

Results such as these are impressive. To understand better how these results happened at Whitney High School and to get their perceptions on the role leadership played in the student success in science, I interviewed the campus associate principal, the science instructional facilitator, the science department chair, and the physics lead teacher.

Whitney Associate Principal

The associate principal at Whitney High School has been in this position for the past four years and has over 20 years of experience as an educator. He stated that for the first 15 years in education he was a biology teacher and coach. He commented that he still misses the classroom, "I loved it, loved it, and I really miss it." After leaving the

classroom, he served as an assistant principal in two different high schools. He feels his experience in several high schools gave him experience in dealing with students at both ends of the economic spectrum as well as experience with very diverse student populations. In addition to serving as associate principal, he is also the administrator responsible for the science department. I asked him to tell me about the science department from when he first became responsible for it and he replied:

> When I first came in I think the science department was the weakest department in the building. They were a bunch of individuals that did their own thing whatever they wanted to do. There wasn't a lot of continuity and pretty much had no overall scope and sequence. There was not an understanding of the TEKS. The teachers taught their own subject, they tested the kids, and they just went on. There wasn't a lot of responsibility for the overall success of the students amongst the department. I got tired of hearing that the students were doing the best they could and that some of them just couldn't make it. And so my very first year when I came on board it took me about a month to figure it out that we had to change that attitude pretty quick so we really started working on it.

I asked the associate principal to share his perceptions on the role leadership had played in the students' success in science. He said that the principal had made it clear to him when he was hired that "the TAKS scores have got to come up" so he did not have much time to sit around. His perceptions seemed to focus on his leadership role. He said he is a 'vocal leader' and always tries to call it the way he sees it. He added that it might have something to do with his experience as a coach. He stated:

> You know, my coaching I did for 15 years and eight of that was as a head coach and you develop skills because of that -- communication skills, leadership skills, decision-making skills. And I'm just a firm believer that really what happened here is I pretty much called it as I saw it when I came on board and asked how we were going to fix it. I told them, "This is what is happening, this is not working, so what are we gonna do to fix it" and I threw it out there.

Some of the actions the science department took as a team included aligning the curriculum, incorporating more hands-on labs, focusing on building scientific vocabulary, and holding teachers accountable. The associate principal commented that he had to:

> … get them out of their comfort zones because some of the areas were not what they liked and we just kind of started working on it. Then we did a lot of brainstorming about things we might do and we got the teachers to understand where we were really weak and where we needed to focus. We came up with a game plan. They began to understand that just because they might teach biology, that doesn't mean what they do doesn't impact the scores the next year. I got them all to understand how basically they are all in the same boat and they need to row in the same direction or they'll never get anywhere. And that's kind of where we started.

He described the science team today as a high functioning team of teachers who work together collaboratively better than they did several years ago when they each went their separate ways. He commented that the teachers plan together, go over labs together, and eat lunch together. He also made the statement:

> I'm not the person anymore as I was my first year that stood up in front of the group and pounded the table. I've gotten away from that. I'm more facilitative now. The department chair handles the meetings now and I'm there to back her up. I've encouraged her to take more of a leadership role. Sometimes I might lean on one of the teachers who is doing something really good in the classroom and encourage that teacher to share the activity with the team. But if someone is not stepping up to the line and turning in lesson plans or going to the meetings, then I'll be the bad guy and confront that issue so the department chair can be the good guy.

The associate principal said that he feels it is important to let the teachers know what is expected of them so there are no surprises and he is pleased that they have "really started to kind of bond together." I asked if the teachers had common planning periods built into the schedule and he said they were expected to stay after school each Wednesday for one hour and each Wednesday had a different purpose. One Wednesday

was designated as a faculty meeting, one Wednesday designated to meet with department chairs, and one Wednesday was designated to meet with content teams. The fourth Wednesday was held open for any staff training that needed to take place such as grade book or other software training. He mentioned again that lunch was another time the teachers got together:

> They meet a lot at lunch, too. We give them all the same lunch, all the science department has the same lunch, so that's another way we do it. And they have kind of adopted that on their own. It's not something we ask them to do but they sit and eat together and discuss a lot of things that way. I'd say the science department has made the largest growth as far as becoming a group caring about each other and each other's successes.

I asked him what else besides leadership and building high functioning teams might have contributed to their success in science and he mentioned that the teachers have changed what they do in the classroom. He stated:

> I really concentrate on the type of interactions the teachers are having with the kids. I'm looking for more positive interactions with kids than negative ones. I'm looking for the engagement level of the kids in the classroom and all I'm going to say about that is we are going to make sure we are engaging the students in our lessons by making the students discuss, making them answer questions, making sure they are taking notes, making sure they are participating in groups. You know, we are not allowing any kids to sit in the back and be anonymous. The teachers are getting really good at this. And our instructional facilitator had a huge impact on that, too, no doubt. She is great about working with individual teachers and getting them to try new things. She is always showing up with new activities or treats for the kids and the teachers. She really knows how to work with them.

The associate principal also named several new campus programs that were initiated. These included (a) mandatory TAKS warm-ups year-long, (b) tutoring after school two days each week, (c) pullout sessions for re-teaching small targeted groups of students, (d) scientific vocabulary activities for all classes, even non-science classes, (e) Saturday TAKS review for four Saturdays prior to the TAKS, and (f) TAKS Blitz

rotation two weeks prior to the TAKS. As I was wrapping up the interview, he commented:

> You know, there are always these little things about leadership and I just think that as adults, teachers in particular, they respect someone they see doing things and not just saying things. So they see me working hard and they see me doing the little things and I think it encourages them to work a little harder and do a little more for our students.

Whitney Science Instructional Facilitator

Another person on Whitney's campus who works hard is the science instructional facilitator. It was a treat to be in her office because she is so passionate about science. The walls were covered with posters of butterflies, birds, animals, human body systems, mountains and rain forests. Tubs full of science activities were stacked around the walls. The table she used for a desk was skirted with an animal print material, and several ivy plants were perched on top of file cabinets with vines full of leaves looping across the ceiling. In the midst of the science materials, I also noticed binders on the bookshelves labeled with TEKS, TAKS results, and other assessment results. When I commented about all the science materials in the room, she responded:

> It's all about helping my teachers help the kids be successful in science and love science so that maybe they can see a future in the science field. Whatever it takes for me to help my teachers, I'll do. Whether it's curriculum, whether it's instructional help, whether it's helping tutor their kids, whether it's putting labs together, or creating TAKS reviews, I do whatever they need me to do so that they're successful in making their kids successful.

I asked her how she happened to get interested in science education and she said that it was not her original plan. She ran track in college and earned a physical education degree with a minor in biology. When she graduated and began looking for a teaching position, she realized there were more positions available for science teachers than there

were for physical education teachers and she started thinking about teaching science. She said the more she thought about it, the more she liked the idea. She commented:

> I decided I wanted to bring science as a hands-on experience. Like physical education is all experience based, you know, you're all hands-on, your body's moving, and I wanted to bring that to science. My goal was to try to transition what I love in physical education and science, but into the science classroom.

She also commented that she loved every minute of being a science classroom teacher and had taught for 15 years on two different campuses. She has been the science instructional facilitator at Whitney High School for the past four years and is excited about the growth in TAKS scores that has happened during that time. When I asked her if she felt that leadership played a role in that success, she responded:

> I believe leadership has everything to do with student success. Our leadership team has placed a priority on science education and helping science teachers to be the best they can be. The leadership team supports teachers with curriculum and instruction as well as positive support in the classrooms. The students have seen a shift in the focus and have realized that science can be fun and educational at the same time. The support is positive and nurturing. That is a funny word, 'nurturing' but if the teachers feel supported in a positive and caring way, they will work hard to keep that going. Their attitudes then impact the kids.

Next, I asked the science instructional facilitator if she could give me some examples of things the leadership team had done that she felt helped with the success in science. She said, "The leadership team supports them by giving them curriculum planning time, encouraging them to attend workshops and conferences, helping with discipline, and assisting in any way to help with instruction. It feels like a team effort."

Because the leadership team on a campus can be any one of several different organizational structures, I asked her to describe what she considered the leadership team at Whitney. She said it consisted of the campus principals, the counselors, the department

chairs, and the instructional facilitators. I asked her to describe her leadership style and she commented:

> My style is hands-on and positive. I do everything in my power to let the teachers know I support them and am there to assist not boss. My communication is in person. Again, I am a hands-on person. I get on the floor in labs with kids, I walk in teachers' classrooms and assist, I come by their planning period and talk, and I attend every department meeting. I am everywhere. One of the hardest things I do is help with setting goals. We look at the school goals and then we try to determine what the science department's goals are. When everyone buys into that, we are good to go. But we must make sure the goals we are working on are everyone's goals. Otherwise, nothing gets accomplished. But I also 'whoo-hoo' them whenever I see them. I praise them and I pump them up. I am happy, positive, and supportive. I bring them little things like stickers, candy, little sayings and notes. I want them to know I am behind them 100%.

During the interview with the instructional facilitator, she mentioned several other areas in addition to leadership that she felt helped with the school's success in science. She said she felt the leadership team was the most important part but that they also had done considerable work on aligning the curriculum, focusing on vocabulary, developing TAKS reviews, creating their TAKS Blitz, and involving their teachers in analyzing data to identify struggling students. An additional area she mentioned dealt with instructional strategies and she said that this was a major shift for her teachers. She stated:

> One of my challenges was just the whole high school teacher mentality. I don't know. It's just weird. It's like, "I'm the teacher and I'll be up here lecturing like a college class and you students just do whatever." The teachers' attitude was like, "If the kids get it, great and if the kids don't get it, then, hey, I did my job." So I had to train them and get them to see another way. I had to get them to see that the kids need to be interactive in this learning process. I had to convince them that this college professor mindset just didn't work in high school. I guess that's why I try to be available so much and try to help out in the classrooms. They've just about all come around. They have discovered it's more fun for the kids and more fun for the teachers when it's interactive instead of lecture.

Whitney Science Department Chair

The Whitney science department chair also believes in having fun in the science classroom. Our interview took place in her chemistry classroom. I asked her how she happened to decide to teach science. She responded:

> Actually, it was a chemistry teacher I had in college who made it fun to be in his class. I have always loved science but after that chemistry class I remember thinking how great it would be if I could do the same thing in high school classes with high school students. I think all teachers have somebody in their life that made a difference and I try to do that for my students. Really, I try to do that for my teachers, too. For me, I see my role as department chair as an extension of what I do in the classroom. I try to run the department like I run my classes. I mean, it's a little bit different like apples and oranges in terms of adults and kids but I see it as just another way to be a teacher. And I want my teachers to have fun teaching so I try to model what that looks like and how it happens.

We talked for a while about her role as department chair. She said it was part managerial and part motivational. In addition to teaching several chemistry classes, she also has two conference or planning periods during the day. She commented:

> Most of that time is spent doing department things, all that behind the scenes stuff, all the schedules, all the tracking of lesson plans, reading lesson plans, juggling the budget, keeping an eye on expenditures for the department, and keeping an eye on my new teachers. It's also a lot of communication and emails to the department for organizing sort of what goals are for the week or for the day. It's a lot of communication, a lot of organization and structural time for the department, tracking down who needs what and when -- a lot of paperwork and planning and meeting.

I asked her if she considered herself a leader and she commented that that was where the motivational part of her responsibilities came in. She shared that she is not only responsible for keeping her teachers on track, but also for keeping them motivated to come to work each day. When I asked her to explain, she responded:

> A leader is someone who motivates those around them to do more than they ever thought possible. I believe this is done through personal example, as well as

> humility, inspiration, and gentle instruction. A leader never forgets that success is a team effort, as is failure. I feel I have high expectations, but in a hands-off way. I believe in modeling what I expect from my teachers. I am nurturing but I can have that tough conversation, too. I also try to be a champion for my teachers and watch out for their best interests in meetings with administration. I will fight for my teachers if I have to so they have what they need.

When I asked the department chair to describe her perceptions of the role leadership had played in the students' success in science at Whitney High School, she commented that leadership had made all the difference. She stated:

> The principal is very clear on what is expected and that vision is communicated very clearly through the associate principal. They give us all the support we need but it really helps that we know what the goal is and where we need to be.

She also shared that she believed another source of leadership that had also made a difference in their success was the leadership and guidance from the science instructional facilitator. She commented:

> We are really like partners and she is ready to help at all times. We've worked really hard to build teamwork. That has been a major focus. And we have worked to build those relationships with the teachers in the department to really make them feel like we are in it together. We worked to get them to set higher expectations for the kids -- to really be able to maybe see some of the teachers who had taught the same way forever and ever and ever to really encourage them to embrace some change and to do it in a way that wasn't threatening to them.

She stated that one of the actions taken by the team to bring them together when she first became department chair was the development of a social contract for the science department. The social contract stated the goals of the department and the expectations of team members when working together. Everyone worked on it, everyone signed it, and it was posted in the team room. She said they do it every year now and it has become an important part of their team. She shared that it is especially helpful with

new teachers because it helps them to feel they are part of the team and to know what is expected of them.

I asked her about any programs or emphasis that might have also helped with the student success in science and she mentioned several programs that had been put in place. One of the programs is a daily TAKS-based warm-up for the science classes. She described it for me:

> We definitely use TAKS warm-ups in our day. One of the things I really push the teachers for are the warm-ups. We all have different styles so one teacher might be using a power point or another might be using foldables or someone else might be using a handout. But the content has to do with reviewing some TAKS-tested concept. Sometimes it's a real lower level of comprehension like "here's some facts about momentum", and then a couple of quick questions about momentum. It's like a little five-minute mini TAKS review. And even though I'm teaching chemistry, in the spring my warm-ups will be biology and physics warm-ups. As we move through the year, we encourage the teachers to pull warm-ups not necessarily related to their discipline so, for example, physics will be doing chemistry warm-ups.

The department chair also mentioned how important working on vocabulary is for the students in science. Teachers are given a list of words generated by the science instructional facilitator that are seen frequently on the TAKS test. The teachers can use any kind of instructional strategy to introduce the scientific words to the students and then use some sort of an activity to engage the kids in learning the words. At the end of each six weeks, the students are tested on that vocabulary. She stated:

> We really encourage them to look for science words everywhere -- it's really everywhere. We pick a scientific word and encourage the students to look at all the parts of speech and some of the teachers are doing a sort of four square approach where they fold a piece of paper into four sections. In one section the students put the definition and in another section they put antonyms or synonyms. In another section they use it in a sentence and in the last section they put in a visual image. At the beginning of the year, the teacher gives the kids the visual image but by the end of the semester, the students are developing their own visuals that are related to the word. Some teachers let their students go to the

> Internet to find visuals. Then, too, testing the kids on the vocabulary seems to make the teachers accountable for getting in the habit of including the vocabulary practice in their lessons.

The department chair also mentioned that the teams have done a lot of work aligning the curriculum within each science area. They have worked on pacing the scope and sequence so that teachers in the same content area are working on the same unit together. She explained how she encouraged collaboration and sharing best practices within the team. Another area they focused on was to develop their labs and increase the rigor. She stated:

> We're trying to move our labs into higher-level labs. It's great for the lab to be fun but if the lab is an afterthought to the content as opposed to the lab actually using the content, we need to make some changes. There are so many examples of good labs on the Internet that we really have no excuse for not doing effective labs with our students.

Whitney Physics Lead Teacher

The physics lead teacher and I met in the front office conference room. In addition to teaching physics, she also teaches several dance classes and manages the high school's drill team. This will be her fourteenth year to teach. When I remarked it was not often that a physics teacher also taught dance, she responded:

> I have a degree in biological sciences and I was a pre-med major, but then I decided to have a life instead of going to med school. I kind of basically fell into teaching. I had taught dance for several years growing up and while I was in college. I figured I would look into teaching and when I applied for a science position, it just so happened that the school had a physics position open with one section of dance. So it appealed to me. For me, because physics is so very structured and linear and based on mathematics, it seemed to fit since dance's formations are all very linear. I just see it well.

I asked her if it was difficult to teach two such diverse areas and to be part of two teams. She shared that there was not actually a team for the dance and drill team and that she was identified more as part of the science team. She said she plans with the other physics teachers and because she has been teaching physics on the campus longer than the other teachers have, she is the lead teacher for physics and handles many of the managerial aspects of the physics team.

I asked her to describe what leadership in general is like on the Whitney campus. She immediately mentioned how terrific the science instructional facilitator was and how that person was always available and ready to help with any issues. She also mentioned the associate principal and commented, “He’s wonderful.” I asked her to explain what she meant by ‘wonderful’ and she responded:

> He’s just wonderful. He has an open door policy and you can just walk in and you feel like he is present in your conversation. He’s not listening to pacify you. There has never been a time that he ever wavered in supporting me in my decisions. He totally supports you. I know of several teachers who have gone to him with an idea asking for white boards so they could make their classrooms more interactive. He found the money and got their white boards. I mean, I guess he sees the passion in the teacher. If he sees that you are passionate about it, that you can make it work, he’ll go leaps and bounds to get you what you need to make you successful. That’s what I feel that he does. He supports. He is open to new ideas. The other thing, too, is he is in the hallways with the kids. I see him in the hallways with the kids and you can see how the students interact with him. I think students are very perceptive and they like him.

When I responded that he sounded like a hard worker, she shared that he was always the first to arrive in the morning and the last to leave in the evening for as long as she could remember. She added that he was also honest with the teachers and said:

> I mean, he’s a straight shooter. He’s not going to tell you just what you want to hear. You know, if the answer is going to be ‘no’, he’s not going to sugar coat it. He’s not afraid to make a decision.

I asked her if she thought the leadership had anything to do with the success they had experienced in science and she commented:

> Oh gosh, yes. The entire administrative team supports us and knowing that lets us focus on what we are doing in the classroom to get the kids engaged. And especially our science instructional facilitator -- she is always there with ideas and new things to try. I love the vocabulary thing we are doing and she pretty much is the reason for making it happen. When she came we started to focus on vocabulary, and that's when we really started clicking with really pushing and holding the teachers responsible for doing the vocabulary work and the TAKS warm-ups but then also holding the kids responsible for doing the work. I mean our department is really close and so we communicate really well and when something is working, we share it. But if something isn't working, then let's get with the instructional facilitator and change it. Our department chair is a great one to go to for ideas, too. She can really make things happen and if administration is asking us to do something that is not reasonable or is a busy project, our department chair will go fight for us and a lot of the time, we don't have to do it.

When I was wrapping up the interview with the lead teacher, I asked if she wanted to share anything else. She hesitated and then added that it would be nice if the administrative team would recognize how much the teachers had accomplished over the past several years. She said it was great that they were supportive and always got them what they needed, but that a little praise would be nice. She remarked about how hard all the teachers had worked to help the students and that it would be nice if it were recognized. She added:

> I'm not saying that we weren't encouraged. I just don't feel like we were praised. It's amazing what a pat on the back and 'good job' will do for you as a teacher. You know, you do it for your kids every day in the classroom. Even if the kid's not right, you know, you ask a leading question to get them back on the right track and you say 'good job' and you give them positive reinforcement. Whereas we haven't, or at least I haven't, felt that positive reinforcement from administration. Our instructional facilitator is the only one who came down when the scores came out, you know, and she did a whoo-hoo dance for us because we had set a new record. That was really special. It meant a lot to us."

Summary

As I analyzed the results of these interviews with the campus leaders, several common themes emerged from the data. These included (a) clear vision and goals from the principal, (b) high performance expectations for teachers and students, (c) importance of collaborative teams, (d) unconditional individualized support for teachers and teams, (e) modeling new practices, and (f) encouragement to develop new programs as needed. These themes will be discussed in greater depth in Chapter VII when compared with themes developed from the case studies of the other high schools in this study.

CHAPTER VI

CASE STUDY THREE: TURNER HIGH SCHOOL

Background of Turner High School

For my third case study, I visited Turner High School. Turner is located in an expanding part of the town. The houses nearby are new two-story brick homes with landscaped yards. Originally, this area was mainly small farms and dairy operations. Today the dairies are gone and have been replaced with freeways, places to shop, places to worship, and places to eat. The community has become a suburb of Houston without becoming part of it and the majority of the residents commute to jobs located in Houston.

The current high school building was constructed in 1974 in what was then the outskirts of town. As the district grew, the need for additional classrooms developed and in 2000, the district renovated the high school, added classrooms, updated science labs, updated athletic facilities, and updated the technology infrastructure. Today the school serves over 2900 students and a second high school is under construction with a projected completion date in 2012.

Growth in population has also brought a change in the ethnic make-up of this community. While this campus is less ethnically diverse than the student population in the previous two high schools, it has shifted toward greater diversity, which has resulted in a changed student population. The ethnic breakdown of Turner High School is 18% Hispanic, 72% White, 6% African American, and 4% Native American or Asian/Pacific Islander. Of these students, 14% are classified as economically disadvantaged. This

compares to the state's ethnic breakdown of 41% Hispanic, 41% White, 15% African American, 3% Native American or Asian/Pacific, and 40% economically disadvantaged.

Organizational Structure of Turner High School

The students at Turner are served by one principal, one associate principal, seven assistant principals, seven counselors, two curriculum facilitators, and 170 teachers. Each assistant principal is assigned to one content area and each content area has two department co-chairs. The principal explained that the concept of department co-chairs was something they had seen in another school district as a way to grow teacher leaders in an expanding district. When the new high school opens, one co-chair from each of the departments will go to the new high school and will already have experience as a department chair. In addition to the department co-chairs, the science department has a teaching staff of 20 and team leaders for biology, chemistry, and physics. A science curriculum facilitator is shared with other campuses. The organizational structure is illustrated below in Figure 3:

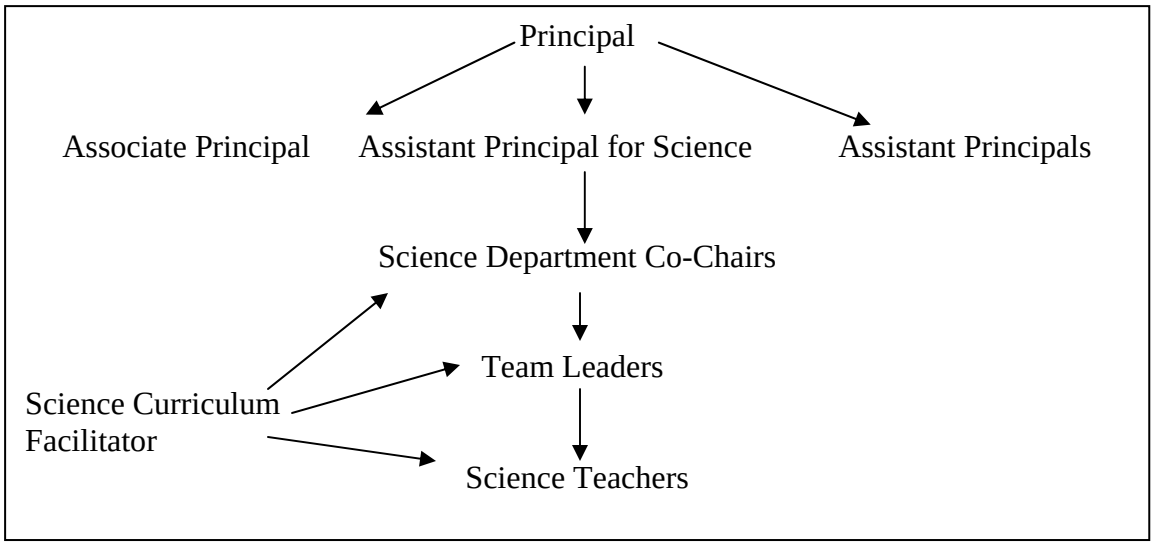

Figure 3. Organizational structure of Turner High School.

Student Success in Science

As mentioned earlier in this report, student success in science for this study is defined as the students' ability to pass the state-mandated TAKS test in science. The schools selected for this study had to meet the following parameters with respect to student success in science:

- Campuses have experienced an improvement in student passing rates on the science TAKS test that exceeded the state's percentage of improvement in passing rates for the past three years.
- Campuses have experienced an increase in student passing rates on the science TAKS test that exceeded 15 percentage points for the period 2003-2008, demonstrating a history of improvement.

Interviews with Personnel at Turner High School

The increase in science achievement as shown in the parameters above helped the school achieve a TEA rating of *Recognized*. To understand how this increase in student achievement was accomplished, I interviewed the science curriculum facilitator, one of the science department co-chairs, the chemistry team leader, and the IPC team leader.

Science Curriculum Facilitator

When I met with the science curriculum facilitator, she explained that she has held this position for the past four years and that prior to that she was the science department chair here at Turner High School for seven years. She commented:

> As far as becoming department chair, the administration asks classroom teachers in the department if anyone is interested in the position and then everyone in the department votes on which teacher they want to be the department chair. The administration has to agree with the selection. You're not given any training. You're just kind of thrown into the position and suddenly you've got a budget of fifteen thousand dollars for you to manage all year long. You're the counselor for the department and you're doing everything with no additional training so you figure out real fast on your feet how to do it.

She indicated that as it turned out, it was great training for her current position as science curriculum facilitator and meant that she did not start from scratch building relationships with the science teachers because she already had good relationships with them. I asked her how she happened to get interested in teaching science. She responded:

> Science was my favorite class in high school. I originally started in pre-veterinary medicine. I worked for a vet one summer while I was in college and I was crying every other day so I decided I couldn't do that for a living. I started looking around and ended up deciding to teach science. Chemistry has always been my favorite. I miss the classroom but I still get to work with students when I work with the teachers.

The science curriculum facilitator described her position as being focused on supporting the teachers in the classrooms and stated she feels strongly that teaching is a team process. She said, “I always felt that the team work here at Turner was what made the science department successful.” This belief was also mentioned in a brief conversation I had with the assistant principal responsible for the science department. He also felt that the focus on building teams in the science department was one of the most significant actions they had taken to improve the department. The science curriculum facilitator commented that in addition to teamwork, the teachers have worked for the past several years on aligning the curriculum and designing programs to improve student success. They are given one curriculum-planning day each month and it seems to be effective. For example, in one of the planning days they realized that just offering tutoring after school was not working because the students that really needed to come were not coming. They decided time had to be provided during the school day instead. Some of the programs they have created include (a) benchmark assessments, (b) tutoring pullouts, (c) science journaling, (d) Ten Days Till TAKS Kits, and (e) vertical curricular alignment.

I asked the science curriculum facilitator to describe her perceptions of the role leadership played in the students’ success in science and she said she felt it was critical. She said that without leadership the department would not be able to address the needs of the changing student population. She said, “We can’t teach today’s student the way we were taught.” I asked her to give me an example and she commented that the biggest challenge for the leadership team had been to get the teachers out of their comfort zone

and help them see the bigger picture. She shared that building the teams was important but they also had to change the mindset of the teachers. She stated:

> At the high school you have to be careful how you work with the teachers. I mean they have this attitude, "I have my own ideas, my own ways, and I want to teach it this way because I have always taught it this way and it's worked before." So I have to go in and ask them if it's still working today without appearing to be criticizing what they are doing. We look at data, we identify which students are being successful and who are struggling. I really think getting the teachers' mindsets to change has probably led to all of the successes we have had. You know, the old mind set was, "I'm teaching and it's their responsibility to learn." The new mind set is, "It's my responsibility as a teacher to make sure everyone in my classroom is learning and I won't allow them to put their heads down and I won't allow them to choose to do nothing." That's been a struggle for some teachers but I think everyone's gotten there.

She added that convincing teachers that every student counted and that they could not overlook students who were not trying did not happen overnight, but that gradually she started noticing teachers taking more responsibility for their students' learning. She commented:

> We went from "Oh, I'm not calling all these parents," to "I'm calling five parents a day because I don't want these kids to get behind, so far behind." I think the message finally got through that, you know, you can't just let them all fail. You've got to do something. If you are a teacher in the classroom and your failure rate is forty percent, then there's something wrong with what's going on in your classroom.

I asked her if there were any other examples of how she felt campus leadership influenced student success in science, and she replied:

> Well, the administration has made it pretty clear for the last four or five years that they want our school to get a 'Recognized' rating. So I guess that is kind of like they are setting the goal for the campus or the focus for the campus, but there wasn't a lot of discussion about it. They just said this is our goal and then it's pretty much left up to the department to come up with plans or ways they could reach that goal. Truthfully, the administration is pretty much hands off. They might ask for a plan or want to see what you are doing for your TAKS preparations for the year, but there's never any kind of dialogue with the department individually -- certainly not micromanaging. Each department is kind

> of self-managing. I mean, the administrators never see a lesson plan, never ask for a lesson plan. The department chairs handle all that. Then, too, the administrators know we will take care of business. Our scores have shown that so I guess they trust us to keep it up and do the right things for kids.

When we were wrapping up the interview, the science curriculum facilitator emphasized how close the science department was and how much they supported each other. She feels that one of the reasons for a lot of their success is that they do not want to let each other down. The team has experienced a low turnover and the majority of the department has been together for over five years. She said they truly care about each other.

Turner Science Department Co-Chair

The science department co-chair has been teaching chemistry at Turner High School for the past eight years. She has a degree in biochemistry and she worked for a chemical company in its research department for several years before she became a teacher. She explained:

> I've always been interested in science. I got my science interest when I was 13 years old during a summer program and I decided at that point I was going to be a scientist. I just loved science and so I went off and got my bachelor's degree. At that time, I thought I would be doing research as a career but after seven years, I realized I hated my job. I loved the science part of it but I was in the technical support section of a chemical company and all I did all day was talk to people who were having problems with the chemicals or didn't know how to set up an experiment or how to dissolve their custom chemicals. Just a lot of irate people. It definitely taught me patience but one day I just decided I wanted to try teaching high school students. And I've been doing it for eight years and love it.

She explained that she also enjoys her role as co-chair for the department and described it as a shared responsibility but division of labor. Her responsibilities as science department co-chair are to handle all the ordering and budgeting while the other co-chair

focuses on keeping the department functioning as a team. When I asked about her leadership style, she said:

> I'm more of a hands-off kind of person. I mean I'll jump in and help if I need to. I like helping people solve their own problems. But instead of trying to take over, I kind of, I'm not sure of the words for it, but I kind of guide them towards what they need or where they need to be. We haven't ever had any kind of training but I'm half way through the principal certification and so I kind of know how to handle or how to facilitate others growing as a team.

We talked for a while about the team aspect of the department and if it was helping with student success. She stated:

> Our campus has really gone to a team paradigm. Since our district mandates that we give common assessments and analyze the results, we just about have to work together as a team. I'm glad we are teaming because before that it was just me and one other teacher who planned together. There were other teachers who taught what I was teaching but they really weren't team players and really just did their own thing. Over the past several years, they have come around and I think they can see the benefits of working as a team. The biology team has always been a pretty strong team but the rest of the science department struggled at first.

I asked her if she would describe her perceptions of the role that leadership played in the success that their students had experienced in science. She responded:

> Well, I think it's very important and it's gotten better over the past few years. I know there have been years in the past where we certainly didn't feel like we were getting support for science or any recognition of the improvements we were making. Nobody was very enthusiastic because they thought what they did didn't matter. It was like, "It doesn't matter what I do. Nobody's paying attention. Nobody's going to help me. Nobody's going to look at what we've done except at the end of the year, here are the scores, and by the way you could have done better." But it's been better the last three years.

The science department chair described the leadership style of the principal as "very, very hands off." She commented:

> He's very helpful but you have to go and ask. You know, if you want to go to a workshop or if you need something for the classroom, he'll stand behind us and

> support us and find the money to get us what we need. I remember last year we wanted to do a Saturday review for about one hundred of our students who needed extra help right before the TAKS. And we wanted to provide door prizes and snacks to encourage the kids to come. So our principal found the money and got the community to donate prizes. The kids loved it.

She commented that the assistant principal over the science department stayed busy with discipline issues and only occasionally attended their team meetings and department meetings. When I questioned her about how often she saw him, she said that most of their communication was through emails and that he was good about responding to questions or issues quickly. She also stated that she felt the communication within the department was very good and was either in person during the passing time between classes or through emails.

Turner Chemistry Team Leader

The chemistry team leader has been teaching at Turner High School for the past 10 years and has been the chemistry team leader for the last five years. She initially taught IPC and then biology but her true love is teaching chemistry. When I asked her how she got interested in science education, she answered:

> Well, honestly, I can say it came from my high school science teacher. I come from a very, very small school. Just to give you an idea, there were 24 people in my graduating class. My science teacher was just really good. I can remember he would come in and have all this stuff and say “Here’s what we’re going to do,” and then we would have the most amazing labs. I mean, we didn’t have a lot of resources and he was more that willing to always go out and get those resources for us from different places and he was always bringing things in to help us really, really understand it. I think that’s probably what triggered me the most was his determination and willingness to do the extra stuff to help us.

The chemistry team leader said that she tried to be that kind of teacher for her students and that the other teachers on her team felt the same. They "are constantly bouncing ideas off each other." She gave me an example of a unit they created:

> Today would be a perfect example. We're starting a new unit on the atom but we chose to do it in a different format because, we were like, you know, lecture just doesn't work all the time with these kids. So we came up with an activity for it and pulled it all together. It's basically a kind of matching game with the kids. They did most of the work. We weren't just preaching to them and it made a world of difference. The kids really got into it and it really helped them understand the basic concepts we were trying to get across.

We talked about her role as chemistry team leader and about how her leadership had helped the team to be successful. She commented she did not know much about her leadership and had never had any leadership training. She described herself as the "go to" person for the team because she helps figure out who to go to for issues or who to go to for resources. She commented:

> I guess I'm very fortunate. We all work well, very well, together and we have kind of an unspoken understanding of what we're doing because we have been working together so long. Usually, my responsibilities as team leader, I'm the one that takes care of the lesson plans and the budget. I also take care of making copies for the team and getting the materials ready for labs. Sometimes chemicals need to be mixed up or measured out and I do that for everyone. We all just know each other and go, okay, we can do this, and you know, we roll with it. It's just we click as a team and don't have to, you know, meet a lot on a daily basis because we just, we got that click, we're going.

I asked the chemistry team leader to share her perceptions about the role leadership has played in the success in science their students have been experiencing and her comments focused on the campus principal. She commented:

> Leadership certainly has made a difference for us. Our principal is very straight forward. He will just tell you what he thinks and that if this is something he feels strong about, he will just flat out tell you this is a non-negotiable and it has to happen. He doesn't beat around the bush about things. He doesn't -- what is the

> word I am looking for -- he doesn't try to make everything look pretty. He just flat out tells you the true thing and well, just, this is it. If he's really proud about you for things, he will tell you. He's also very goal-oriented. He's not afraid to tell you what he expects and if you're not going to abide by it, you know, you can expect to be down there talking to him. He feels like to make our success in TAKS, we have to pay attention to our student failure rate and he is very adamant about those failure rates. A fifteen percent failure rate is the limit and if you have more than fifteen percent of your students failing, you can bet you're going to be down talking to him.

She also shared that while the principal set high expectations for the teachers, he was also very good at recognizing when they accomplished those expectations. She told me about a huge TAKS celebration the school had before the school year started. The science department was recognized for their success on TAKS. Everyone in the department appreciated the recognition for what they had achieved. In addition to her perceptions of the leadership of her principal, she also mentioned the leadership provided by one of the department co-chairs. I asked her to give me an idea of what the co-chair's leadership was like and she responded:

> You know, she's amazing in my opinion. She is not afraid to fight for what she thinks needs to be done. If there's a new policy or something that the district is demanding of us, she is not afraid to get in anybody's face, I guess I should say. She will go and fight for us tremendously. A perfect example would be our TAKS scores one year. We had a very big improvement in science and our district is really good about recognizing our departments within the school but we weren't mentioned in the district's recognitions. She felt like we should have been recognized so she went and fought for us and when we came back to school, we had a big apology and we were recognized for what we had accomplished. She's very -- oh, I don't know the word I'm trying to say -- she's very strong, she's very confident, and she's not afraid to get us what we need. Another time she didn't back down was when we needed an extra teacher last year. She was willing to fight for that. She puts herself out on the line.

We continued talking about other examples of leadership from the department co-chair. The chemistry team leader obviously felt much supported by the department co-

chair and stated that she believed the rest of the science team felt the same support. Because the examples she gave related to the relationship between the team and the district or campus administration, I asked her about the relationship of the department co-chair within the department when it came to setting goals or making decisions. She responded that the department set goals as a team:

> Our department co-chair will tell us what we need to accomplish and then we kind of expand on it together. She's a great motivator and because she has a lot of experience, she can help us figure out the best way to do things sometimes. She feels like a part of our team, not the head of our team. And it's not as if we can't go to the administrators for help, too. They are always very open and welcome and willing to help us get whatever we need. Most of the time if it's something related to kids, we'll go directly to the assistant principal for that student and get the situation worked out.

As I was wrapping up the interview, I asked her if we should talk about anything else or if she wanted to add anything. She thought for a minute and then added that because the interview was about leadership, she should also mention the role played by the science curriculum facilitator. She stated:

> Well, I need to say something about our science facilitator because she is responsible for a lot of the things we do right in the department. She was the previous science department chair and she really kind of set the tone for the department. She's so outgoing and just so upbeat and all and willing to help however she can. She got promoted and when the current department co-chair took over the position, she just kind of carried on what had already been established as routine. It has worked out really well.

We concluded the interview with her comments about the department being made up of very strong willed individuals who were committed to doing whatever it took to help the kids be successful.

Turner IPC Team Leader

The IPC team leader has been teaching at Turner High School for the past five years. Prior to teaching, she worked in the human resources department for several companies and was used to working with people all day. She said not only did she work with people all day, but also that she worked with all different types of people and she felt those experiences had prepared her for teaching and working with all different types of students and parents. I asked her what made her decide to teach science. She responded:

> I've always loved science. I really think it was my seventh grade science teacher who turned me right into it. It was introduction to biology and it was my first class that I had as a non-ESL student and I loved it. I don't know if it was just her and the way she made the subject interesting or just everything together but I stuck with science all the way. I had some other really good science teachers but that seventh grade biology teacher was the one I remember the most.

When I asked her about her role as team leader, she pointed out that the IPC team had five teachers and that she was team leader on paper only and that the team did not really have a leader. She explained:

> We don't believe in a team leader. The team kind of manages itself. Not every group needs someone that is going to stand up and say this is what we are going to do. We're always open to change. If somebody has an idea, they bring it up to the table and we talk about it. We all strongly believe in meshing. We have our meetings once a week after school and that's when we plan for the next week or two depending on what unit we are on. We talk and we discuss what's coming up next, what quizzes we want, what we want the quizzes to cover, and what labs we plan to do. It's all very collaborative. As the team leader I don't say "This is what we're going to do and this is how you are going to do it." My role as team leader is really more managerial and so I make all the copies. Someone else makes the quizzes and someone else makes the schedule for the lab because we have five IPC teachers and only one lab. But we also rotate responsibilities -- we have a certain rotation.

She also mentioned that the assistant principal in charge of the science department frequently attended their team meetings. She described his participation as mainly just sitting in the meeting and observing. He might occasionally ask a question or make a comment but he mainly just observed. He also frequently asked if they needed anything or if there they had any issues that needed his help or attention. She shared that both of the department co-chairs dropped by their meetings but usually did not stay for the entire meeting. They also asked if the team needed anything.

I asked if she would share her perceptions of the role leadership played in the success they experienced in science and she commented that the leadership of the principals and the department chairs were critical to their success in science. She said the principals set the goals and the department chairs helped the teachers achieve those goals. The principal is very clear that the teachers need to do whatever it takes to help students to succeed on the TAKS test. He tells the teachers, "you do it or you do it." I asked her what that meant and she said it meant that if a teacher wasn't successful, that teacher could find another job. I said that seemed a little harsh and she said:

> He says it in a nice way. It's all about delivery. He holds the department chairs accountable for student success. He expects the department chairs to hold the team leaders accountable and the team leaders pass it down to the rest of the teachers. So, for instance, if a lot of kids miss a certain IPC concept on the TAKS test, it comes back to the IPC team and he expects us to change the way we are teaching that particular TEK. He expects us to look at the curriculum, look at the activities, look at the instructional strategies and change something. But he doesn't tell us what to change. He tells us we are the experts in science and he will get us whatever we need but that something needs to change.

The IPC team leader reinforced what others had stated in the interviews when she shared that the principal always supported the team and the department's ideas for new programs to help the kids learn science. I asked her to give me some examples of

programs the team or the department had proposed and that had been implemented. Examples she provided included (a) TAKS tutoring during D-Hall by content teachers, (b) vocabulary program for ESL students focusing on TAKS vocabulary, (c) revised curriculum, scope, and sequence, and (d) Ten Days Till TAKS kits.

According to the IPC team leader, most of these programs were developed during department meetings with the science facilitator. I asked her to describe how that worked and she related that after a benchmark or curriculum assessment, sometimes the science facilitator would bring the results to the department meeting and they would discuss them. She said they looked for any areas in which the kids were struggling and talked about what needed to be changed. Sometimes it was a simple fix like re-teaching a concept. However, one huge problem they kept running into involved their ESL population and the scientific vocabulary they needed to understand in order to be successful in science. To address this issue, they put together a team of science teachers and student tutors to work with the ESL students in small groups twice each week using a variety of activities to help the ESL students learn the vocabulary. These activities were generated by the science facilitator. The team leader stated that she felt the program had been successful but more important, the entire department had worked together to make it successful.

Because this interview was conducted during a school day during her conference period, I was anxious to wrap it up before students arrived for the next class. I asked her if there was anything else she wanted to share or anything she felt was important to their student success in science. She responded:

> I know I have been talking a lot about how important our teams are and how well we work together but our administrators play a major role, too. Our principal

> empowers teachers. He also empowers the assistant principals who in turn empower the department chairs who in turn empower the team leaders who in turn empower the teachers who then empower the students. It's always how can we make it better and if there's a problem, doors are always open. Administrators have, whether it's the most minimal thing or whether it's the greatest thing, their doors are always open. You ask for something, they will provide it for you. No questions asked.

Summary

The Turner High School campus was the largest of the campuses I visited for the case studies. I was apprehensive about using a high school with such a large student body because I have experienced firsthand how difficult it is to keep everyone pulling in the same direction when you are working with almost 200 teachers, not to mention all the support staff. However, this campus has been able to stay extremely focused as evidenced by their students' success in science. Several themes emerged during the analysis of the interviews and follow-up conversations with the participants. These included (a) clear vision and goals from the principal, (b) high performance expectations for teachers and for students, (c) importance of teams, (d) unconditional individualized support for teachers and teams, (e) encouragement to develop new programs to address problems, (f) modeling key values and practices, and (g) open door policy from the administrative team. These themes will be discussed in greater depth in Chapter VII when they are compared with themes developed from the case studies of the other two high schools.

CHAPTER VII

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

In past generations, school leaders were viewed more as administrators than leaders. Their time was spent focusing on problems of budgets, buses, and books. Teachers went into their classrooms and closed their doors. However, today's school leaders face a different world and they confront challenges that are more complex every day. In today's environment of high accountability for student success, campus leaders are expected to produce students capable of becoming productive members of our society. One expectation the public has is that students will have a strong foundation in science. This study looked at three public high schools in the Houston area that are meeting that challenge.

This naturalistic study was undertaken to shed some light on the issue of leadership and student success in science by examining perceptions from school administrators and science department leaders regarding the relationship between leadership practices and success in science on their campuses. By exploring these perceptions, insight was gained concerning the role leadership plays in student success in science thereby providing additional information to campus leadership desiring to help every student succeed.

The study focused on answering the following questions relating to student success in science:

1. What are the perceptions from administrators with respect to leadership and successful student performance in science on their campuses?
2. What are the perceptions from science department leaders with respect to leadership and successful student performance in science on their campuses?

Three participant schools were purposefully selected based on several factors. All selected schools were secondary campuses with ninth through twelfth grades, which met the following criteria:

1. The campuses have experienced an improvement in student passing rates on the science TAKS test that exceeds the state's percent improvement in passing rates for the past three years.
2. The campuses have experienced an increase in student passing rates on the science TAKS test exceeding 15 percentage points for the period 2003-2008 demonstrating a history of improvement.
3. The science department leaders (department chairs and grade-level team leaders) have held their positions during the most recent three-year period of increasing passing rates and were available for interviews.
4. The administrators have held their administrative positions on the campuses during the most recent three-year period of increasing science performance and were available for interviews.
5. The campuses were within the Texas Educational Service Center (ESC) Region IV in order to strengthen the commonality of support systems and training available to each campus. ESC Region IV currently serves 54 school

districts with over 150 high schools in eight counties in Texas and over 1,000,000 students. These school districts are located in urban areas such as Houston ISD as well as the rural areas of Hempstead ISD.

Data for this study was collected from in-depth interviews with campus administrators, science department chairs, and grade-level science team leaders at each site. The interviews took place on each campus in a conference room or in the teacher's classroom. These interviews were semi-structured and audiotaped. Follow-up phone interviews or emails were conducted as needed for clarification or additional questions. Data gathered through the interviews was broken down into units, categorized, coded, and analyzed for emerging themes and sub-themes. Themes and sub-themes were analyzed with respect to constructs found in transformational leadership theory based on a framework chosen a priori of transformational leadership by Leithwood and Jantzi (2005). In their model, Leithwood and Jantzi presented three broad categories of transformational leadership:

1. Category One is building school vision and goals, which Leithwood and Jantzi referred to as "Setting Directions." Also included in this category was the transformational leadership behavior of setting high performance expectations.
2. Category Two is providing intellectual stimulation, which Leithwood and Jantzi referred to as "Helping People." This category also included transformational leadership behaviors that provided individualized

consideration and/or support for others and modeling key values and practices.

3. Category Three is building collaborative cultures, which Leithwood and Jantzi referred to as "Redesigning the Organization." This category also included the transformational leadership behaviors of helping to create organizational structures to foster collaboration, and building productive relations with parents and the community. (Leithwood & Jantzi, 2005, p. 181)

Conclusions

Based on the perceptions of leadership from the campus leaders in the case studies, individuals who were interviewed reported their beliefs that leadership on their individual campuses helped with student success in science. Each case study indicated that these perceptions of leadership had common major themes, including (a) clear vision and goals from the campus principal, (b) high performance expectations for teachers and students, (c) teacher support from campus leaders, and (d) emphasis on collaborative teams. Secondary themes identified included: (a) modeling key values and practices, (b) encouragement and support to develop new programs to address problem areas, and (c) open door policy from campus leaders. There were no discernable patterns across administrators, across science department chairs, or across team leaders.

Category One -- Visioning

Starting with Category One, as I thought back over the conversations I had with individuals on each campus, I was struck by the consistency in the interviews in the reporting of the role played by the principal in setting and communicating a clear vision

and goals for the campus. It was surprising to me that the principal on each campus set the goals and that collaboration with teams for the purpose of setting goals was not mentioned. The department chair at Addison High School described his principal as being very clear when he stated, “This is where we need to be.” The department chair at Whitney High School also reported the principal as being very clear on what is expected and included, “They give us all the support we need but it really helps that we know what the goal is and where we need to be.” The science curriculum facilitator at Turner High School voiced the same clarity of vision from her principal.

Research supports the importance of a clear vision and clear goals for student achievement on effective campuses. Cotton (2003) reinforced that belief when she shared from her research that effective principals have a vision of what they want students to achieve and are able to articulate goals clearly for student achievement. Sparks (2007) stated, “Lack of clarity, resignation, and dependency on the part of principals and teachers are major barriers to quality teaching in all classrooms and the successful learning of all students” (xviii). In their book, *Encouraging the Heart*, Kouzes and Posner (2003) explained how important goals are to individuals and how goals help “get us moving with purpose and energy” (p. 53). They also pointed out “Exemplary leaders make sure that work is not pointless ambling, but purposeful action” (p. 53).

Category One also focuses on setting high performance expectations. Evidence of this leadership dimension was mentioned in each of the twelve interviews on the campuses. High performance expectations were communicated from the principal to the science team leaders, from the science team leaders to the science teachers and from the science teachers to the students. Cotton (2003) stated, “The principal’s expression of high

expectations for students is part of the vision that guides high-achieving schools and is a critical component in its own right" (p. 11). Accountability was built into each of these levels of high performance expectations through common assessments and data analysis. In a comment directed to principals, Daresh (2006) advised, "… your ability to create a vision may be an important way to provide an added value to the vision that can be attempted in your school. Remember that most accountability efforts are directed toward ensuring that minimal standards are met. Your job as a leader is to search for ways that go beyond the minimum" (p. 125). Harris (2002) echoed this sentiment in her study on schools facing challenging contexts when she stated that principals in these schools "shared high expectations and a determination to achieve the highest possible standards" (p. 23).

In a meta-analysis of twenty-seven studies on leadership and student outcomes (Robinson, Lloyd, & Rowe, 2008), the authors reported "evidence of the importance of goals and expectations" (p. 659) on student achievement. Their research indicated an indirect but positive effect on student achievement. This may be achieved because clear goals help to focus and coordinate the work of teachers. Goals directed toward student achievement levels or higher achievement gains indicate that the content and specificity of the goals is important as opposed to vague, generic goals.

Category Two -- Supporting

Category Two addresses the two areas of (1) individual consideration, and (2) modeling key values and practices. Individual consideration was mentioned by the campus leaders in each interview at each campus. Further evidence of individual consideration was demonstrated by the open door policy of administrators and campus

leaders on each of the three campuses in the study. Supporting teachers and giving them the support they need came across to me as a sincere commitment from the campus leaders, both administrators and teachers. For example, the principal at Addison High School mentioned that if you raise the expectations for teachers, you must also raise the support for teachers. He stressed his willingness to give the teachers what they needed to do their job.

In their study of schools as learning organizations, Silins and Mulford (2004) concluded that in successful high schools, "There is an emphasis on the development of professional relationships, which build a school climate of trust and cooperation. Teachers and students are supported in their work to promote their growth and success" (p. 463). The science facilitator at Whitney High School stated, "Whatever it takes for me to help my teachers, I'll do." The department co-chair at Turner High School shared the same attitude, that as the "go to" person, she makes sure the science teachers on her team have what they need for their classrooms.

The second part of Category Two, modeling key values and practices, was mentioned in seven of the twelve interviews. This leadership practice was also perceived as one of the most difficult. Modeling new practices and encouraging their teachers to adopt those new practices, new instructional strategies, or new attitudes toward reaching every student was described as a difficult process but one that was also critical to improving the science departments. Research tells us that "school leadership has an important influence on the likelihood that teachers will change their classroom practices" (Leithwood & Jantzi, 2006, p. 223). In their study of a high school science department chair, Rigano and Ritchie (2003) reported the use of modeling desired practices as a

leadership practice used by the department chair. Ritchie, Mackey, and Rigano (2006) also reported on the use of modeling desired practices in a science department as a leadership practice that encouraged and supported instructional changes in the science classroom. The biology team leader at Addison High School commented, "… you have to encourage the teachers you are working with because some of them have been in their little box for a long time and you are asking them to get out of it and take some risks."

The science instructional facilitator at Whitney High School shared those views and mentioned the need to shift the "high school teacher mentality" from teaching with lectures to a more inquiry-based, hands-on type of teaching focused on student learning. In the interview with the science facilitator at Turner High School, she also mentioned the difficulty of changing the mindsets of the high school teachers but that "getting the teachers' mindsets to change has probably led to all of the successes we have had." In his study of ten successful principals, Day (2004) commented that, "Leading well over time is a struggle and it takes passion to continue to encourage self and others to continue to lead and learn in changing and challenging times" (p. 436).

The science facilitators on two of the campuses provided unconditional support for their teams, modeled key values, and practices while providing encouragement for their teachers to develop new programs when needed to help struggling students. These facilitators provided materials, activities, and ideas for the teachers while communicating unconditional support for the efforts of the teachers and motivating them to work harder. One of them even gave an occasional "whoo-hoo" to the teachers when they were exceptionally successful.

The associate principal at Whitney High School mentioned in the interview how important it is to model what you expect. He stated,

> You know, there are always these little things about leadership and I just think that as adults, teachers in particular, they respect someone they see doing things and not just saying things. So when they see me working hard and they see me doing the little things and I think it encourages them to work a little harder and do a little more for our students.

The department chair at Whitney High School voiced similar beliefs when she stated, “A leader is someone who motivates those around them to do more than they ever thought possible.” She also commented that she motivated others by setting a good example and modeling what was expected. She reported having high expectations for her teachers but also demonstrating what those expectations looked like.

Category Three -- Collaborating

Evidence of Category Three leadership behaviors was found in each of the twelve interviews with campus leaders. This category refers to practices that encourage collaboration on the campuses or the creation of school structures that encourage collaboration. A committed and strong focus on encouragement for collaboration could be seen in the emphasis placed on teams and team building on each of the campuses. The science curriculum facilitator at Turner commented, “I always felt the team work here at Turner was what made the science department successful.” A similar feeling was expressed by the department chair at Whitney when she mentioned how hard the teams had worked to align the curriculum.

In an article about organizational and instructional practices, Elmore (2002) discussed how complex and difficult instructional practice and the improvement of instructional practice can be and stressed the high levels of knowledge and skills needed

to address these issues. He stated, “the subject matter, how learners master the content, the attitudes that learners bring to the subject, the pedagogy for connecting content to how students learn… ” all influence the pedagogical choices made by teachers. (p. 24) Collaborative teams give teachers the opportunity to work through these issues. Elmore mentioned the concept that “schools need to have structures that develop the knowledge and skills of individuals and that stretch this expertise among people occupying the same role (such as teachers) and different roles (such as teachers and administrators)” (p. 24).

Others interviewed expressed how important the team was for support and for communication. The assistant principal at Turner also mentioned that he felt the emphasis on building highly functioning teams was instrumental in the student success in science they had experienced. The associate principal at Whitney High School expressed his observations that the science team had developed into a very high-functioning team and were very collaborative and worked together to figure out how best to facilitate student learning. While none of the campuses leaders interviewed referred to their content teams as professional learning communities, the teams shared many of the same features.

Professional learning communities are one of several models aimed at school reform. DuFour (2004) described the concept of a professional learning community as containing three main components that (a) ensure that students learn, (b) promote a collaborative culture, and (c) focus on results.

Teachers collaboratively and purposefully have dialogue about what they want the students to learn, deciding how they will know when each student has learned a concept, and what the instructional staff will do if students do not learn the concept or struggle with learning it. DuFour stressed the importance of recognizing when a student is

struggling and providing support immediately rather than waiting for the end of the six weeks or the end of a unit. He also stressed the importance of collaboration when he stated,

> The powerful collaboration that characterizes professional learning communities is a systematic process in which teachers work together to analyze and improve their classroom practice. Teachers work in teams, engaging in an ongoing cycle of questions that promote deep team learning. This process, in turn, leads to higher levels of student achievement. (DuFour, 2004, p. 9)

Each of the campuses studied placed a priority on teaming and analyzing data to identify areas needing improvement or students needing help. Research supports these views on the importance of collaborative teaming. DuFour and Marzano (2009) suggested specific actions to be taken by campus leadership to help build the collaborative teams. They stated that the effective principal:

- creates schedules to ensure that teams meet at least one hour each week,
- creates structures to ensure that collaborative team time focuses on issues and questions that directly affect student learning, and
- provides teams with the training, support, resources, tools, and templates they need to become effective. (p. 65)

The Whitney science instructional facilitator shared how the campus leadership supported the science team by "giving them curriculum planning time, encouraging them to attend workshops and conferences, helping with discipline and assisting in any way to help with instruction." She said that it felt like a team effort.

In my research, I used a framework of transformational leadership theory to understand campus leaders' perceptions of the leadership practices on these campuses,

and to understand how those practices influenced student success in science. As can be seen from the study, transformational leadership practices were evident in individuals at each level of campus leadership.

In these case studies, we saw how different individuals in different positions or in different layers of leadership positively influenced student outcomes in science. We saw that school leadership empowered others by creating the relationships or environments that encouraged others to do more than they thought they could. Whether it was the school principal empowering teachers or teachers empowering other teachers or teachers empowering students, the transformational practices of the campus leadership team helped create the environment for student success in science. The principal at Addison High School commented:

> I think the biggest transition we have made on this campus is to get our science teachers to look a little more globally, to realize that the biology team can help the physics team, can help the chemistry team, and that they all have to work together for a common goal -- and that goal is to get our kids where they need to be in the different fields of science. We are growing our teachers into leaders in their teams and leaders in the classroom and that is resulting in student success.

This study and these perceptions from campus leaders add to the research base of work focusing on the effectiveness of transformational leadership in schools while also adding to the research base of work examining the role leadership plays in student achievement, specifically in the area of science education. This study also informs and provides a resource for administrators and school leaders on campuses seeking ways to improve student achievement in science.

Recommendations for Further Research

While this study focused on the relationship between school leadership and student success in science, more research is needed to examine the nature of various levels of leadership on campuses, specifically at the department chair level and the team leader level. These “leadership in the middle” positions have received little attention, but they play an important role in student success in science, as seen in these case studies. When questioned about available leadership training, campus leaders interviewed in the present study indicated that there had been no formal leadership training. Teachers are encouraged to continue to develop their instructional skills but how many are encouraged to develop their leadership skills and grow as campus leaders?

Another area of interest that potentially impacts student success in science is the relationship between school leadership and the use of technology in the science classroom. Today’s students typically know more about technology than their teachers do. They walk around with ear buds and iPods connected, and teachers wonder why they are not interested in PowerPoint presentations. A study focusing on the role school leadership plays in encouraging the use of technology in the science classroom would be beneficial to educators.

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APPENDIX A

CONSENT FORM

Perceptions of Leadership and Student Performance in Science from Campus Leaders in Selected High Schools

Introduction
The purpose of this form is to provide you information that may affect your decision as to whether or not to participate in this research study. If you decide to participate in this study, this form will also be used to record your consent.

You have been asked to participate in a research project examining the perceptions of school administrators and science department leaders regarding their leadership practices in science on campuses with sustained student success in science. The purpose of this study is to gain insight concerning the role leadership plays in student success in science thereby providing additional information to campus leadership desiring to help every student succeed. You were selected to be a possible participant because your campus has demonstrated over three years of sustained student success in science.

What will I be asked to do?

If you agree to participate in this study, you will be asked to participate in a face-to-face interview with the principal investigator during which you will share your perceptions about the leadership practices on your campus and how those practices relate to the sustained student success in science on your campus. The initial interview will last 45-60 minutes with follow-up interviews if needed for clarification. Your participation may be audio-recorded.

What are the risks involved in this study?

The risks associated with this study are minimal, and are not greater than risks ordinarily encountered in daily life.

What are the possible benefits of this study?

You will receive no direct benefit from participating in this study; however, this study will provide additional information for school administrators and campus leaders with respect to effective leadership practices on campuses with improving science programs.

Do I have to participate?

No. Your participation is voluntary. You may decide not to participate or to withdraw at any time without your current or future relations with Texas A&M University being affected.

Who will know about my participation in this research study?

This study is confidential and the records of this study will be kept private. No identifiers linking you to this study will be included in any sort of report that might be published. Research records will be stored securely and only Sharon Wilder, the principal investigator will have access to the records.

If you choose to participate in this study, you may be audio recorded. Any audio recordings will be stored securely and only Sharon Wilder, the principal investigator, will have access to the recordings. Any recordings will be kept for twelve months and then erased.

Whom do I contact about my rights as a research participant?

If you have questions regarding this study, you may contact Sharon Wilder at 936-931-3685 or by email at swilder_97@yahoo.com or sharonwilder@tamu.edu.

Whom do I contact about my rights as a research participant?

This research study has been reviewed by the Human Subjects Protection Program and/or the Institutional Review Board at Texas A&M University. For research-related problems or questions regarding your rights as a research participant, you can contact these offices at 979-458-4067 or irb@tamu.edu.

Signature

Please be sure you have read the above information, asked questions, and received answers to your satisfaction. You will be given a copy of the consent form for your records. By signing this document, you consent to participate in this study.

_____ I agree to be audio recorded.

_____ I do not want to be audio recorded.

Signature of Participant: _____ Date: _____

Printed Name: _____

Signature of Person Obtaining Consent: _____ Date: _____

Printed Name: _____

APPENDIX B

DEBRIEFING STATEMENT

Perceptions of Leadership and Student Performance in Science from Campus Leaders in Selected High Schools

Thank you again for helping me with this study. The interview you just participated in was to provide data for my dissertation in partial completion of a degree plan to receive a Ph.D. in Educational Administration from Texas A&M University.

As you were informed before the interview, your participation was totally voluntary, you could quit anytime or omit any question(s), any names used or recorded will be replaced with pseudonyms, and I was willing to answer any questions you may have had any time during the interview.

This research study has been reviewed and approved by the Institutional Review Board -- Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, the Institutional Review Board may be contacted at 979-458-4067 or email irb@tamu.edu.

Also, in the event that you feel you need to talk to someone about issues raised during the interview, you can call TAMU Student Counseling Service at (979) 845-4427 or their Helpline at (979) 845-2700 (evenings and weekends).

Participant's Signature & Date Indicating Receipt of Debriefing Statement

APPENDIX C

INTERVIEW PROTOCOL

Perceptions of Leadership and Student Performance in Science from Campus Leaders in Selected High Schools

1. Thanks again for agreeing to an interview. Let's start with you telling me a little bit about your background in education.

2. How did you happen to become interested in science education? (Delete this question for administrators.)

3. Before we start talking about specific issues in the science department, would you give me an idea of what a day looks like in your role on the science team (or administrator, etc. depending on individual being interviewed)?

4. Give me an idea of your responsibilities as science department chair (or team leader or administrator, depending on individual being interviewed).

5. Which of these responsibilities would you chose as your primary responsibility?

6. Could you give me an example of some typical interactions with others on the science team?

7. How does your role on the science team that compare to the roles of others on the science team? (Change 'role' to 'interaction with' for administrators.)

8. How does that compare to the roles of others on your campus?

9. Talk a little about the science team with respect to the rest of your campus as well as other teams on your campus.

10. How important are teams on your campus?

11. What responsibilities do you have on the campus in addition to those for science? (Delete for administrators.)

12. How would you describe the relationship between science and other content areas on campus?

13. Now let's focus on the science department again. Let's talk for a minute about your perceptions of leadership and the role it plays in the science department.

14. What do you feel have been the key reasons for your team's ability to produce and sustain student success in science? Has leadership played a role? (Describe).

15. How would you rank these in order of importance?

16. Let's start with what you consider the most important -- could you elaborate on that a little more?

17. Now let's focus on the second key reason. Tell me a little more about how that came about.

18. What about the third reason? What does that look like in practice?

19. Talk to me about any changes you made this year.

20. How important is leadership to your team's success?

21. Who do you see as the key leaders on your team? On your campus?

22. Let's consider another issue. What do you see as the biggest challenges faced by your team?

23. Now let's move on. What do you see as the main issues facing science education today? How is your team addressing these issues?

24. Is there anything else we should talk about that you feel is relevant to our discussion -- something I might not know to ask?

25. Do you have any questions for me?

VITA

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